

QuickMAP User's Manual

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Installing and Configuring QuickMAP

QuickMAP Installation with QMSetup

Installing QuickMAP

QuickMAP's QMSetup program will guide you through the installation process, properly configuring QuickMAP for your computer, mouse and digitizing tablet (if you have one). It can also be used to re-configure QuickMAP after changing your system, such as adding a new monitor, changing settings on a digitizing tablet, or altering GEM Device Drivers with GEMSetup. It is important that you use the setup program, because the files on the QuickMAP distribution disk are in a compressed format and must be unpacked by QMSetup before they are useable.

For QuickMAP to run efficiently, it must be installed on a hard disk. To begin the installation process:

- **Put the distribution disk 'QMSetup' in drive A (or B) of your computer. The QuickMAP disk is high density, ie, 1.2 or 1.44 Megabytes.**
- **Switch to drive A (or B), if not already there. To do so, at the DOS prompt, type:**

**A:
(or B:)**

and press < ENTER>

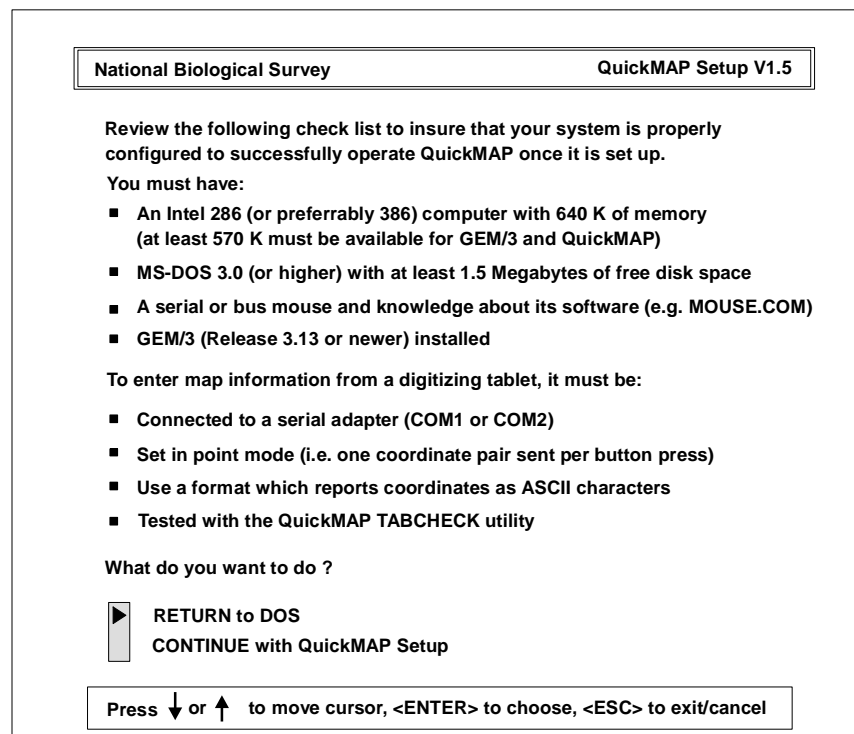
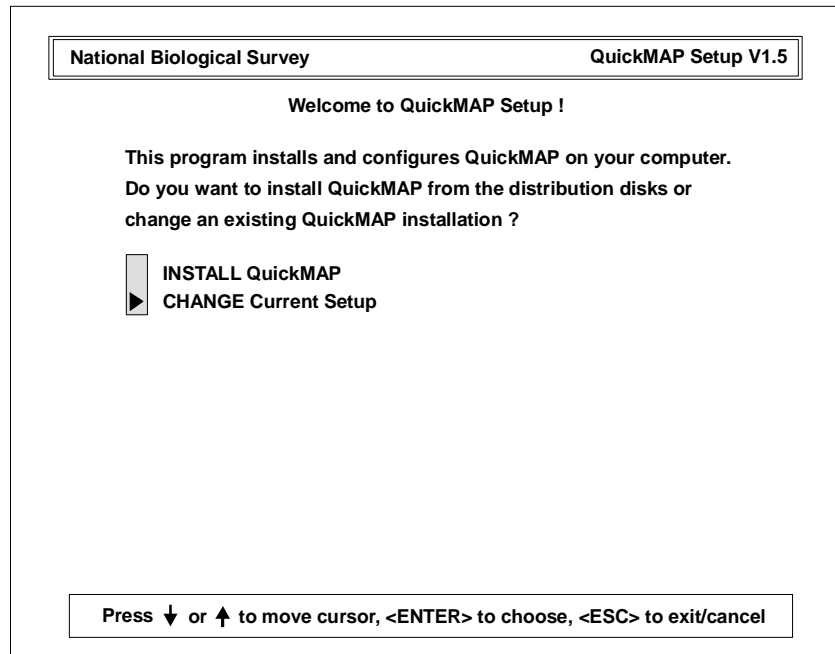
- **Next, type:**

QMSetup

The QuickMAP Setup screen appears after some messages are displayed. The rest of the Setup program will ask questions that you may answer by typing at the keyboard or by selecting from the choices provided. On the first screen, the choices are 'INSTALL QuickMAP' and 'CHANGE Current Setup'. A blinking pointer to the left of 'INSTALL QuickMAP' indicates that it is currently selected. The pointer can be moved between choices with the upward and downward arrow keys. When the pointer is next to the selection you wish to make, choose it by pressing <ENTER>. Also, you may leave the Setup program at any time by pressing the <ESC> key. If you escape from Setup in this manner, QuickMAP will not be properly installed and you will have to start over.

For now, choose 'INSTALL QuickMAP' by pressing <ENTER> when the blinking pointer is to the left of that selection.

Read the second QuickMAP screen carefully. It lists the minimum system requirements to successfully run QuickMAP and the information you must have to complete the Setup program. Especially note that GEM must be installed before QuickMAP, and that the QuickMAP utility program 'Tablook' should be run to help you determine the information needed to install a digitizing tablet (data trans-



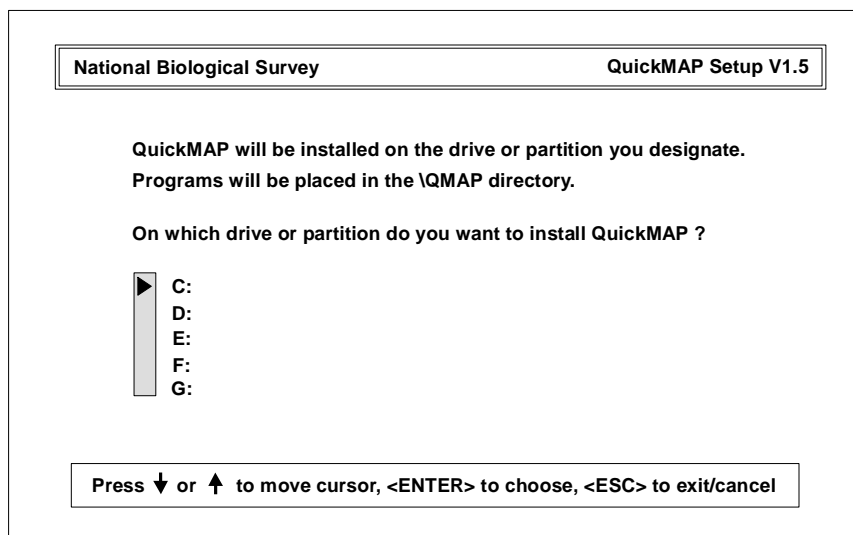
fer parameters such as baud rate, com port, and data format).

If you need to install GEM, run TABLOOK, or locate some other information before proceeding with QuickMAP installation, you may choose 'RETURN to DOS' by pressing <ENTER>. If you have all the information you need, move the pointer to 'CONTINUE with QuickMAP Setup' and press <ENTER>.

You are next asked if you want to include sample mapfiles in your installa-

tion, or programs only. If you have room on your hard disk, we suggest that you include the mapfiles. They will be helpful when learning to use QuickMAP and are necessary to follow the "tour" of the QuickMAP modules presented in Chapter 3.

The next screen prompts you to select a drive for the installation of QuickMAP. Setup will create a directory named QMAP and will install QuickMAP on that directory. The sample mapfiles discussed above will be placed on a subdirectory of the QMAP directory, named EXAMPLES. Setup will check the drive you choose and, if GEM/3 cannot be found, you will be asked to indicate on which drive GEM is installed.



You must next specify if you will be using a digitizing tablet with QuickMAP, or only a mouse. If you choose 'MOUSE only', Setup will give you the option of having the mouse driver automatically loaded with QuickMAP. If you enter a command line for your mouse driver, be sure to use the entire path, including the drive, directory, and file name.



If you wish to install a digitizing tablet, skip to the section below entitled 'Installing QuickMAP with a Digitizing Tablet' and follow the instructions.

Now messages on the screen will indicate the progress of the installation, as the files are unpacked and copied to the QMAP directory.

If any problems are encountered, Setup will issue a message and ask for information or instructions. Setup also writes a file, named QMSetup.RPT, that tracks the progress of your installation process and may contain information about any problems. This file can be found on the root directory of the C drive.

When finished, Setup will issue a message about your installation and whether your system currently has enough free memory available to run QuickMAP.

Installing QuickMAP with a Digitizing Tablet

Remember that you can get help with much of the information needed for tablet installation by running QuickMAP's TABLOOK utility prior to running QMSetup.

If you have chosen 'MOUSE and TABLET' for installation, the mouse command screen will be followed by a screen asking you to specify the size of your tablet's active surface area and its resolution. As in the illustration, the default values (36 inches wide and 24 inches high with a resolution of 1000 units per inch) are on the screen. Note that many tablets have a "dead zone" around their periphery, making the active surface area smaller than the total size of the tablet.

To change default values in QMSetup, note that a blinking cursor is positioned under the first character of the line

to be edited. If you begin typing at that point, the entire line will be erased and replaced by whatever you type in. Also, you may use the following editing keys: left and right arrow keys to skip over one character at a time, backspace to delete the character to the left of the cursor, delete to delete the character over the cursor, and the insert key to insert a character in front of the cursor.

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The tablet's specifications include its active surface area and coordinate unit resolution. Specify the active surface area in inches (width by height) and coordinate resolution in units per inch (e.g. 36x24x1000/IN) below.

Enter Tablet Size and Resolution : 36x24x1000/IN

Press ↓ or ↑ to move cursor, <ENTER> to choose, <ESC> to exit/cancel

The 'Tablet MODE settings' are requested by the next screen. Valid parameters are identified in your DOS

manual under the MODE command. In the example above, "COM2" refers to the communications port your tablet is connected to, "9600" is the baud rate, "E" is parity type (E for even, O for odd), "7" is the number of data bits per transfer, and "1" is the number of stop bits. Your parameters must be entered in the same order as those in the example.

Enter Tablet MODE settings: COM2: 9600, E, 7, 1

The next screen concerns information about tablet initialization commands. See your tablet manual to determine if your tablet requires a special initialization sequence. If your manual gives the command(s) as a character sequence (eg., ESC A), use an ASCII character conversion chart to determine the equivalent decimal numbers, and enter these values separated by commas.

Finally, you are asked to enter your tablet's data transfer format. If you have run TABLOOK and are familiar with your tablet manual, you should have this information. The section of this manual entitled 'The QM.SYS File' has a more detailed explanation of the template under the 'TABFOR-MAT' command.

The installation will now proceed as described above for 'MOUSE only', and a final message will be issued concerning your QuickMAP installation. Be sure to check the QMSetup.RPT file on your root directory if any problems are encountered and before requesting technical assistance.

Changing QuickMAP Setup

The QMSetup program also may be used to re-configure QuickMAP after changes to your system. If you change your monitor type (e.g. from EGA to VGA) or printer, GEM/3 must be reinstalled to reflect these changes. QMSetup will then automatically re-configure QuickMAP the next time it is run to match the changes in GEM. Changing your mouse also requires that QMSetup be run to re-configure QuickMAP. In addition, QMSetup can be used to add, remove or change digitizing tablets and to specify a default mapfile directory.

Start QMSetup as before. With the QMSetup disk in drive A (or B), change to drive A (or B) if necessary and enter QMSETUP. When the QMSetup screen appears, move the blinking pointer to 'CHANGE Current Setup' and press <ENTER>.

On the next screen, select the drive where QuickMAP is currently installed. Some messages will be issued and then a screen similar to the one illustrated at right will summarize your current QuickMAP configuration. If you wish to change something, select 'MAKE another change'.

The next screen will give you the choices shown at right. Select 'MOUSE' if you wish to change the mouse driver command line for a different mouse than the one previously

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QuickMAP Setup V1.5

QuickMAP must be re-configured whenever GEM/3 or Tablet settings change.
Display and Printer changes are made automatically to reflect current
GEM settings shown below :

GEM installed on C:\GEMAPPS\GEMSYS	GEM Display is EGA
QuickMAP Resources are EGA	GEM Printer PEL = 85
QuickMAP Output PEL = 85	
No Mouse Driver Loaded with QuickMAP	
Tablet Input Disabled	
Default Directory (or Map) is C:\QMAP	

Are you ready to :

☐ MAKE another change

☐ EXIT and SAVE changes

Press ↓ or ↑ to move cursor, <ENTER> to choose, <ESC> to exit/cancel

Which setup do you wish to change :

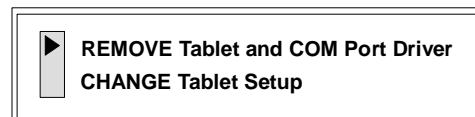
☐ MOUSE

☐ TABLET

☐ MAP DIRECTORY

installed. After you type in a new command line on the next screen and press <ENTER>, you will be returned to the configuration summary. The information will be changed to reflect the change in mouse command.

Select 'TABLET' if you wish to add, remove or change digitizing tablets. You will be given two choices. Select 'REMOVE Tablet and COM Port Driver' to save memory space when you don't really do much digitizing. Or select 'CHANGE Tablet Setup' to install either a new or a different tablet. The latter selection will take you through the tablet installation sequence described above in the section 'Installing QuickMAP with a Digitizing Tablet'. When tablet changes are complete, you will be returned to the configuration summary.



Select 'MAP DIRECTORY' on the Change Setup menu to specify a default directory or mapfile that will be opened automatically when you run QuickMAP. The screen illustrated below will appear.

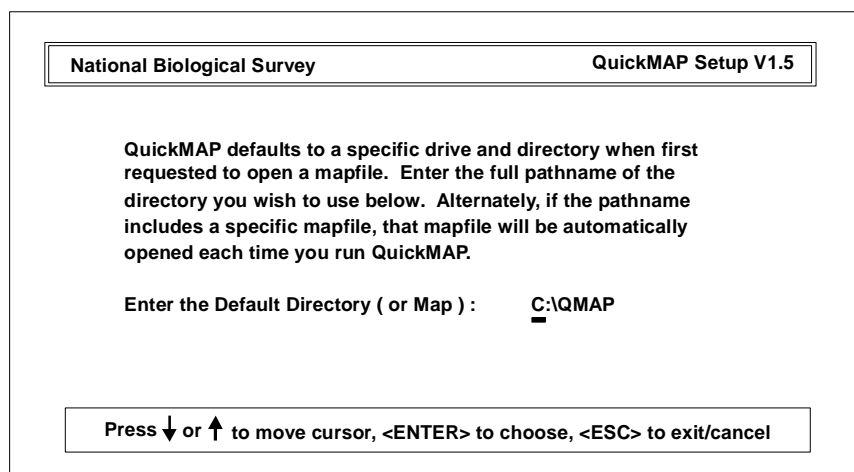
The default drive and directory used by QuickMAP when none is specified by the user is shown in the example. If you specify a mapfile to be opened, be sure to give the full path. For example, you might enter:

C:\QMAP\EXAMPLES
\MANATEE

to open the "manatee" mapfile that is placed on the EXAMPLES subdirectory by QMSetup. When you have typed in your directory and/or mapfile name, press <ENTER>. You will be returned to the configuration summary, which will show the new default directory or map.

When no more changes are desired, select 'EXIT and SAVE changes' on the configuration summary screen. QMSetup will alter the necessary files to re-configure QuickMAP.

Remember to re-boot your computer before running QuickMAP.



The QM.BAT File

The QMSetup program writes a batch file named 'QM.BAT' on your QMAP directory as it installs QuickMAP. You should not need to modify the QM.BAT file if you have successfully completed the QMSetup installation, but a brief discussion of the file may help you understand how QuickMAP is configured and solve possible installation problems. The batch file will be similar to the following:

```
ECHO OFF
CLS
PATH C:\;C:\DOS;C:\MOUSE1;C:\QMAP
ECHO QuickMAP (Version 1.5) configured for QM400
ECHO Setup QuickMAP's Environment . . .
ECHO  Programs in C:\QMAP
CD C:\QMAP
SET MBPATH=C:\QMAP
ECHO  GEM/3 in C:\GEMAPPS\GEMSYS
SET GEM=C:\GEMAPPS\GEMSYS
C:
CD C:\GEMAPPS\GEMSYS
IF /==/%1 GOTO NOMAP
ECHO  Default Directory (and Map) are C:\QMAP\EXAMPLES;%1
SET MAP=C:\QMAP\EXAMPLES;%1
SHIFT
IF /==/%1 GOTO GALLERY
SET QUICKMAP=%1
ECHO  Use QuickMAP's %1
MARKTSRS
ECHO Mouse Driver Loaded
GOTO TABCHECK
:NOMAP
ECHO  Default Directory is C:\QMAP\EXAMPLES
SET MAP=C:\QMAP\EXAMPLES
:GALLERY
SET QUICKMAP=GALLERY
ECHO  QuickMAP set to GALLERY
MARKTSRS
MOUSE$
:TABCHECK
IF /TABON==/TABON GOTO TABLET
ECHO  Disable Tablet and COM Port Driver
GOTO STARTGEM
:TABLET
```

```
ECHO Load COM port driver for 25 tablet coordinates
INTRS232 COM2 375
:STARTGEM
GEMVDI -QM400
ECHO Remove QuickMAP's Environment and Return to DOS . . .
PULLTSRS
OLDPATH$
```

A brief description of the commands in the QM.BAT file follows. Some commands are best understood when grouped together.

ECHO OFF

- turns the "echo" off so that all the commands from the batch file are not sent to the screen. Subsequent ECHO commands display information about QuickMAP's specific configuration as it is loaded.

CLS

- clears the screen.

PATH C:\;C:\DOS;C:\MOUSE1;C:\QMAP

- drives:\directories where all programs needed to successfully run QuickMAP can be found. The drive:\directory where QuickMAP is installed is appended to the path when QMSetup is run.

ECHO QuickMAP (Version 1.5) configured for QM400

- identifies the version and memory requirements (not including GEM) of QuickMAP

ECHO Setup QuickMAP's Environment . . .

- "Setup QuickMAP's Environment . . ." will be sent to the screen.

ECHO Programs in C:\QMAP

CD C:\QMAP

- identifies and then changes to the drive:\directory where the QuickMAP programs are being loaded.

SET MBPATH=C:\QMAP

- identifies the path (drives and directories) where MegaBASIC should look for QuickMAP programs. (QuickMAP is written in the MegaBASIC programming language.)

ECHO GEM/3 in C:\GEMAPPS\GEMSYS

- identifies the drive:\directory where the GEM drivers are installed.

SET GEM=C:\GEMAPPS\GEMSYS

C:

CD C:\GEMAPPS\GEMSYS

- sets, and then changes to the drive and directory where the GEMVDI programs and GEM device drivers are found. QuickMAP must be able to locate these files to run properly.

IF /== /%1 GOTO NOMAP

- If no parameter for a default directory or mapfile was specified in invoking QM.BAT (%1 is a code for the parameter), the batch file now skips down to the line that begins :NOMAP. If a parameter was specified, the batch file continues with the next line.

ECHO Default Directory and Map are C:\QMAP\EXAMPLES;%1

SET MAP=C:\QMAP\EXAMPLES;%1

- identifies, and then sets the path (drive:\directory\mapfile) used to open a mapfile when QuickMAP is run. This directory and mapfile are specified by the user as the first parameter (%1) when invoking QuickMAP.

SHIFT

- shifts over to read the next parameter that can be specified while invoking QM.BAT. The next parameter tells QuickMAP which module to open when it starts. The possible modules are GALLERY, ASSEMBLY, DISPLAY, and DRAW.

IF /== /%1 GOTO GALLERY

- if no module parameter was specified, the default is GALLERY, and the batch file skips to the line beginning with :GALLERY. Otherwise, the batch file continues with the next line.

SET QUICKMAP=%1

ECHO Use QuickMAP's %1

- sets, and identifies on the screen, the module to be automatically opened by QuickMAP. To automatically open any module other than the GALLERY, a mapfile must have been specified and successfully opened.

MARKTSRS

- a utility program that marks the place of any TSR programs that are installed following this line in the batch file. A TSR is a program or command that Terminates and Stays Resident. Examples would include mouse or tablet drivers installed by QuickMAP. Once such a program is run, it remains in computer memory and takes up space. Invoking MARKTSRS prior to loading a TSR will allow the use of the PULLTSRS utility to remove the TSR later, reclaiming memory for other uses without having to re-boot the system.

ECHO Mouse Driver Loaded

- the command string used to invoke your mouse driver.

GOTO TABCHECK

- the batch file skips to the line beginning with :TABCHECK.

:NOMAP

- marks the section of the batch file that sets a default directory for mapfiles if none was specified by the user invoking QM.BAT

ECHO Default Directory is C:\QMAP\EXAMPLES

SET MAP=C:\QMAP\EXAMPLES

- identifies, and sets the drive:\directory to be used as a default for opening mapfiles. This default is used if none is specified as a first parameter when QM.BAT is invoked by the user. This default drive:\directory may be set and changed by the QMSetup program.

:GALLERY

- marks the section of the batch file that sets the module to be opened if none was specified by the user invoking QM.BAT.

SET QUICKMAP=GALLERY

ECHO QuickMAP set to GALLERY

- sets, and identifies on the screen, the default module to be opened (GALLERY). "QuickMAP set to GALLERY" is sent to the screen.

MARKTSRS

MOUSE\$

- installs, as described above, the TSR program that serves as a mouse driver.

:TABCHECK

- marks the section of the batch file that handles a digitizing tablet.

IF /TABON==/TABON GOTO TABLET

- if a digitizing tablet is to be used, the batch file skips to the line beginning with :TABLET. Otherwise, it continues with the next line.

ECHO Disable Tablet and COM Port Driver

GOTO STARTGEM

- notifies the user that QuickMAP is not set up for a digitizing tablet. The batch file then skips to the line beginning with :STARTGEM.

:TABLET

- marks the section of the batch file that provides for use of a digitizing tablet.

ECHO Load COM port driver for 25 tablet coordinates

INTRS232 COM2 375

- announces and then loads 'INTRS232', a special TSR program needed for the digitizing tablet. "COM2" identifies the serial port used by your tablet. "375" indicates the size, in characters, of the serial port's buffer to buffer tablet input. The buffer size is normally set to handle 25 coordinate values.

:STARTGEM

- marks the section of the batch file that loads GEM for QuickMAP.

GEMVDI -QM400

- loads GEM and runs QuickMAP.

ECHO Remove QuickMAP's Environment and Return to DOS . . .

OLDPATH\$

PULLTSRS

- removes TSR programs as described above under "MARKTSRS" and restores the DOS path to its original state if it has been altered by running QuickMAP. This does not actually happen until you exit QuickMAP.

The QM.SYS File

QMSetup creates a 'QM.SYS' file as it installs QuickMAP on your QMAP directory. It contains information that allows your computer system to work with the peripheral devices used by QuickMAP, ie., the mouse, printer, and digitizing tablet.

QMSetup writes to the QM.SYS file the tablet information you provide during installation. QuickMAP will work with any digitizing tablet that: 1) uses an absolute (rather than relative) data reference system; 2) communicates via ASCII character strings (rather than in binary); and 3) uses an RS232 serial port (rather than, for example, an IEEE422). If you change digitizing tablets, run QMSetup and select 'CHANGE Current Setup'. The QM.SYS file will be modified to make QuickMAP compatible with the new tablet.

A brief explanation of the entries in the QM.SYS file may help solve possible problems encountered during QuickMAP installation. The QM.SYS file contains the following entries:

PRINTRES =
TABSPEC =
TABMODE =
TABINIT =
TABFORMAT=
TABMENU =

Each entry is presented below as it might appear in the QM.SYS file following installation of QuickMAP with a digitizing tablet using QMSetup. A brief explanation of each is included.

PRINTRES = 85

- defines printer resolution (in microns) for QuickMAP output. If no printer is installed for GEM, this entry is left blank. If a printer is installed, this value should be provided for proper software fill using patterns in output. A utility program, 'PRINTRES.PGM', is provided with QuickMAP. It is run automatically by QMSetup to determine the 'Print Res' value for your printer.

TABSPEC = 36x24x1000/IN

- The first two numbers (36 and 24) are width and height, in inches, of the tablet's active surface area. The third entry (1000/IN) is resolution, in digitizing units per inch.

TABMODE = COM2:9600,E,7,1

- tablet MODE settings. "COM2" is the serial port to which the tablet is connected. Usually, COM1 is used for the mouse and COM2 for the tablet. "9600" is the tablet baud rate. The "E" stands for Even parity; the other possible selections are "O" for Odd or "N" for None. The "7" and "1" are for number of data bits and stop bits, respectively, per data value.

TABINIT = 27,65

- initialization sequence for the tablet. In this example, "27" is the decimal equivalent of ASCII "ESC" (Escape) and "65" is the equivalent of ASCII "A". This tablet requires that ESC A be sent to the tablet before any other data or commands can be sent.

TABFORMAT=?BXXXXXYYYYYRL

- template, or format, used by the digitizing tablet to send data to the computer. Each data value that is sent must, at a minimum, identify a cursor button and coordinate value. For QuickMAP, six possible character types can be used to define the template: ?, B, X, Y, R and L. B indicates the location and width of the cursor button value; X the location and width of the X coordinate; and Y the location and width of the Y coordinate. ("Width" means the number of character positions occupied; in this example, one for the cursor button and five each for the X and Y coordinate values.) R signifies a carriage return and L a line feed character; these are used to indicate whether, or how, the tablet ends the transmission of a data value. Any other information sent by the tablet is indicated by a ? since it is not used by QuickMAP. The total number of characters in the template is used to calculate a reasonable buffer size. Check the user's manual supplied with your tablet and run the QuickMAP 'TABLOOK' utility for more information and help determining your digitizing tablet's data output format.

TABMENU = 9.625x5.5

- size of the QuickMAP paper tablet menu, in inches. Will be set to the correct size by QuickMAP when you do a Tablet Registration in the Draw module.

If only a mouse, and no tablet, is installed for QuickMAP, the second entry will say "TABSPEC=NO TABLET" and the remainder of the information can be left blank.

If a digitizing tablet is to be used, all six entries should be completed with the appropriate information. 'TABINIT' may be left blank if your tablet requires no initialization commands.

Check Tablet Utility

The QuickMAP utility program 'TABLOOK' interacts with a user and a digitizing tablet to determine the communication parameters necessary for the DRAW module of the QuickMAP system to properly communicate with the tablet. The information obtained is used to create or modify the QM.SYS file. The end of this section includes examples of QM.SYS files used for several tablets.

You can run the Check Tablet Utility from two possible locations.

1. If you have installed QuickMAP, move to the proper drive and \QMAP directory containing the QuickMAP programs.
2. If you have not yet installed QuickMAP, you can run the tablet checking utility directly from the distribution disks.

A device driver for the tablet must be installed prior to running the tablet checking utility. The TABCHECK.BAT file automatically loads the driver, INTR232.COM, for COM1 and COM2 with a buffer size of 500 points. It then runs TABLOOK, the tablet checking utility. After moving to the proper drive and directory, simply type

TABCHECK

Note: If you type just TABLOOK to run the program, after you enter a MODE setting, the program would terminate with an error indicating INTR232.COM was not loaded.

If you type TABCHECK, a message will print which indicates INTR232 was loaded for COM1 and COM2 and TABLOOK will begin with a welcome screen.

******* Welcome to the QuickMAP Tablet Check Utility *******

Then:

Drive / Partition

TABLOOK first asks which drive or partition contains or will contain the QuickMAP programs. Based on the answers you supply as you run TABLOOK, TABLOOK either modifies or creates a QM.SYS file on the \QMAP directory of the drive you specify.

Tablet Mode Protocol

The next TABLOOK prompt asks for the Tablet Mode Settings. The information supplied here includes to which COM port the tablet is connected (usually COM2, because the mouse is normally connected to COM1), what baud rate will be used, and what parity, data bit, and stop bit settings will be used. Refer to your tablet and DOS manuals to determine the proper settings.

At several points as you run TABLOOK, information surrounded by asterisks (***) will print to the screen. These sections contain information which may be useful if your system "locks up".

Tablet Initialization

After the tablet mode is set, TABLOOK asks if your tablet requires any special initialization codes. Refer to your tablet manual for these. If your tablet does not require initialization, enter a carriage return. If your tablet requires initialization, you must enter the decimal equivalents of the ASCII characters that make up the initialization sequence, separated by commas. For example, if your tablet requires an initialization sequence of the escape key followed by a capital A, you would enter

27,65

because 27 is the decimal equivalent for the escape key and 65 is the decimal equivalent of a capital A. Note that upper/lower case of letters is significant, i.e, the tablet will not interpret a small letter "a" the same as a capital "A".

Digitize ONE point

Once the mode is set and the tablet is initialized, TABLOOK asks you to digitize ONE point and then press CNTL-BREAK (hold down the Control key while pressing the Break key).

Items to consider when digitizing point(s):

- The tablet **MUST** be in point mode, i.e., the tablet should transmit data only when a cursor button is pressed, and it should only transmit one point each time a cursor button is pressed.
- Do not press any cursor buttons that initiate commands. For example, the F button on a 16-button cursor is often used to initiate sending a command. Pressing a command button may result in an inaccurate interpretation of the data format because confusing messages are sent to the computer.

- If the tablet has an active *menu* area, avoid digitizing in it; otherwise you may inadvertently send commands from the menu.

After you digitize the ONE point, the result on the computer screen should be some combination of letters and numbers in a "reasonable" format; perhaps something like AP31927501295 <Carriage Return> <Line Feed>. This is an example of a data format used by the CalComp 9100 tablet. The first three positions (A, P, and 3) are for tablet status, mode status, and cursor status, respectively. The next 10 digits represent the X and Y coordinates (5 digits each) of the digitized point. If TABLOOK finishes a successful run, this format would appear in the QM.SYS file as

TABFORMAT=??BXXXXXYYYYYRL

The A and P are not used by QuickMAP and are replaced by question marks. The B for cursor status designates the position where the cursor button being used is reported. This is followed by 5 X's and 5 Y's for the coordinate values, and the RL, which designates a carriage return and line feed to terminate the data transmission.

Another example of a "reasonable" format is 10003411995 <Carriage Return>; this is a sample from a Kurta IS/ONE tablet. In this format, the first digit (1) is the cursor button position, the next five digits (00034) form the X coordinate value, and the last five digits (11995) form the Y coordinate value. If TABLOOK finishes a successful run, this format would appear in the QM.SYS file as

TABFORMAT=BXXXXXYYYYYR

where B is the cursor button position, the X's and Y's are for the 5-digit coordinate values, and the R is a carriage return to terminate the data transmission.

See the instruction manual for your particular tablet for information on "reasonable" data formats. In particular, odd characters such as arrows, Greek letters, or "tiny faces" generally indicate invalid tablet data.

Be sure you digitize only ONE point before pressing CNTL-BREAK. After pressing CNTL-BREAK, a short table will print. The left column of the table refers to the type of data which appeared when you digitized the point. The right column of the table gives suggestions for follow up actions. The bottom of the screen lists 4 to 5 options. Choose an option based on the data which appeared when you digitized the point. If all looks OK, choose number 5 to continue with the tablet template check.

Tablet Template

In the next two sections of the program, you will digitize several points and answer questions based on the information transmitted from the tablet. The questions you will be asked are:

- What character position does the CURSOR BUTTON number appear in?
- What are the BEGINNING and ENDING character positions for the X DATA?
- What are the BEGINNING and ENDING character positions for the Y DATA?
- What is the tablet's size and resolution?

First TABLOOK will print suggestions on how to digitize a number of points to assist you in determining the answers to the questions. In determining the:

- cursor button position - it is helpful to digitize several points without moving the cursor on the tablet but using several buttons on the cursor. The only digit position that changes is the cursor button position.
- X positions - digitize several points moving the cursor left and right but not up and down.
- Y positions - digitize several points moving the cursor up and down but not left and right.

Tablet's Specifications - - - Width, Height, Resolution

- tablet's size, i.e., active surface area - digitize near the corners of the tablet. Be aware that some tablets return the last valid point digitized when you digitize beyond the active surface area.
- coordinate resolution - notate the minimum and maximum values for X and Y as you digitize near the corners of the tablet. Also notate, usually in inches, how much of the tablet's surface is actually active.

The Results

When you have answered the questions asked in the 'Tablet Template' and 'Tablet's Specifications --- Width, Height, Resolution' sections of TABLOOK, 'The Results' will print to the screen and the QM.SYS file will be created or modified as appropriate.

QM.SYS files for various tablets

The following are samples of QM.SYS files written for various tablets by TABLOOK.

No tablet

```
PRINTRES    = 0
TABSPEC     = NO TABLET
TABMODE     =
TABINIT     =
TABFORMAT   =
TABMENU     = 9.625x5.5
```

Calcomp tablet

```
PRINTRES    =85
TABSPEC     =36X24X1000/IN
TABMODE     =COM2:9600,N,8,1
TABINIT     =
TABFORMAT   =B?XXXXXXYYYYYRL
TABMENU     =9.625X5.5
```

Kurta IS/ONE tablet

```
PRINTRES    = 0
TABSPEC     = 17X12X1000/IN
TABMODE     = COM2:9600,E,7,2
TABINIT     =
TABFORMAT   =BXXXXXXYYYYYR
TABMENU     = 9.625X5.5
```

For the Kurta IS/ONE tablet, TABMODE can be set to any of the following without any adverse affects:

```
COM2:9600,E,7,2
COM2:9600,E,7,1
COM2:9600,O,7,2
COM2:9600,O,7,1
```

Genius tablet

```
PRINTRES    = 0
TABSPEC     = 12X12X1000/IN
TABMODE     = COM1:9600,0,8,1
TABINIT     = 70,66,106
TABFORMAT   =XXXXXX?YYYYYY?BRL
TABMENU     = 9.625X5.5
```

Numonics tablet

PRINTRES =0
TABSPEC = 12X12X200/IN
TABMODE = COM2:9600,E,8,1
TABINIT = 58,65,70,13,10,80
TABFORMAT=XXXX?YYYY?BRL
TABMENU = 9.625X5.5

For the Numonics tablet, the initialization sequence is :AF <CR> <LF> B

:AF < CR> < LF> = 58,65,70,13,10 for ASCII 200/IN

B = 80 for point mode

Summagraphics tablets

PRINTRES =0
TABSPEC = 12X12X1000/IN
TABMODE = COM2:9600,N,8,1
TABINIT = 66,106
TABFORMAT= XXXXX?YYYYY?BRL
TABMENU = 9.625X5.5

For the Summagraphics tablets, the following internal switches must be set:

AA on for 9600 baud

AB off for ASCII

AC off for no parity

Setting these switches will probably require that you remove the back of the tablet and move jumpers on the control board. See your technical reference manual for more detail. Note that the SummaSketch III cannot be set to communicate in ASCII mode and therefore cannot be used with QuickMAP. Other SummaSketch models can be set to ASCII mode with internal jumpers.

The initialization sequence is: Bj

B = 66 for point mode

j = 106 for 1000/IN

INTRS232

INTRS232 is a device driver required if a digitizing tablet is to be used with QuickMAP; it controls the buffering of data between the tablet and computer. INTRS232 can be installed for either or both COM ports; the driver must be run twice if installing for both ports. The buffers for the two ports are independent and may be different sizes.

Running other software that initializes the com interrupt vector (eg., Crosstalk, Procom) will disable the INTRS232.

If you run the utility MARKTSRS/PULLTSRS to unload INTRS232, this will not reset the interrupt and any subsequent com activity can lock up your system.

System Requirements

Hardware:

IBM/Compatible - 386 or better

RAM - 640K

Serial ports - usually two, for mouse and tablet; plotters may also need a serial port. (See note below)

Hard disk - QuickMAP software requires about 1 Megabyte (1,000,000 bytes) of disk space, and sample mapfiles require about 500,000 bytes.

Math coprocessor - recommended but not required.

Mouse - required. Any type supported by GEM.

Digitizing tablet - required for map registration and precise data entry. Any type that has a serial port interface, sends coordinates and cursor status as ASCII characters, and may be set up in point mode.

Printer - for hard copy of graphics. Any type supported by GEM.

Plotter - also for hard copy of graphics. Any type supported by GEM.

Note: Mouse, tablet, and plotter typically connect to serial ports. Use of COM3 or COM4 devices (such as internal modems) may not be compatible with QuickMAP since DOS only truly supports two serial ports. Consequently, QuickMAP may not simultaneously use a tablet and plotter.

Software:

GEM (by Digital Research, Inc.) device drivers and output utility are distributed and licensed with QuickMAP

Drawing software that can import GEM metafiles is desirable for annotating maps. (For example, Artline or GEM Presentation Team.)

Some QuickMAP limits

- Family names: 1-7 characters, letters only
- Arc names: A family name followed by a number from 1-999
- MapID names: 1-10 characters (including special characters with ASCII code numbers 33-122, except for the three noted below), beginning with a letter or special character (as already defined), but may include numbers; may not include special characters *, ?, or ‘
- Mapfile names: 1-8 characters, beginning with a letter, but may include numbers
- All names: upper and lower case are equivalent, only letters and numbers, no “special” characters except as described for MapID names
- Number of Points per Arc: 2048
- Number of Arcs per Family: 999
- Number of Holes per Outline: 200 for polygon fills; otherwise limited only by available disk space
- Number of Sets per MapID: limited only by available disk space
- Total number of arcs: limited only by available disk space; however, a practical limit is 6550 arcs
- Maximum polygon size: for polygon fills, depends on amount of memory available, but probably not more than 4000 to 5000 points; otherwise limited only by available disk space

Interacting with QuickMAP

Starting QuickMAP

If you ran QMSetup to configure QuickMAP, a batch file named "QM.BAT" was written on the QMAP directory where QuickMAP was installed. To run QuickMAP, you should start on the directory containing QM.BAT, or you must use a path that includes that directory. The simplest start-up command for QuickMAP is:

QM < Enter>

The computer will enter graphics mode after the program has been loaded (this may take a few moments), and the QuickMAP GALLERY screen will appear.

The QM.BAT file will initialize your system and start QuickMAP in the GALLERY if invoked as indicated above. However, you may also enter some optional parameters that will cause QuickMAP to use a particular mapfile directory as a default, to open a particular mapfile, and to automatically enter a specific QuickMAP module. To do this, start QuickMAP by entering:

QM [directory/mapfile parameter] [module parameter] < Enter>

The first optional parameter [directory/mapfile] might be something as simple as 'florida', which is the name of a mapfile. In this case, the four files comprising the QuickMAP 'Florida' database, or mapfile, are located in the 'qmap' directory on the C drive. More information on how to specify mapfiles and directories is given below.

The second QM.BAT parameter [module] is the name of the QuickMAP module to be automatically opened when QuickMAP starts, and can be GALLERY, ASSEMBLY, DISPLAY, or DRAW. If no second parameter is specified, the QM.BAT file defaults to the GALLERY. If one of the other modules is specified, QuickMAP goes immediately to that module, bypassing the GALLERY. For the second parameter to work, a valid mapfile must be opened (either by default or by the first QM.BAT parameter). If an invalid mapfile name or path is given for the first parameter, no mapfile is opened and QuickMAP defaults to the GALLERY. The user must then use the 'Open' command in the 'File' menu to open a mapfile before proceeding to another module.

Following the above examples, if you invoked QuickMAP with the command:

QM FLORIDA DRAW

(and assuming a QuickMAP mapfile named FLORIDA did exist on the QMAP directory on drive C), then QuickMAP would bypass the GALLERY and go immediately to the DRAW module with the FLORIDA mapfile open.

Rules for using the map environment parameter

When QuickMAP is installed using QMSetup, the default drive is set to the drive where the QMAP directory is created. Also during QMSetup installation, the default mapfile directory is set to the EXAMPLES directory where the sample QuickMAP databases are placed. Or, if the user chooses to have no sample databases installed, QMSetup sets the default mapfile directory to QMAP, where the QuickMAP programs are located.

The default drive and/or directory may be changed by running QMSetup, choosing 'Change Current Setup', and proceeding as described in Chapter 1.

Once a default directory for mapfiles is set, the first parameter specified when invoking QM.BAT can be relative to the default. That is, only a mapfile name needs to be given and QM.BAT will look for that mapfile on the default mapfile directory. Also, the default can be overridden by giving an entire pathway (drive:\directory\mapfile) as the first QM.BAT parameter.

If a valid directory pathway, but no mapfile name is given as the first parameter, QuickMAP will begin in the GALLERY with no mapfile open. But when 'Open' is chosen from the 'File' menu to open a mapfile, the dialog will default to the directory given in the first parameter. The mapfiles available on that directory will be listed on the dialog.

If GEM is installed on a different drive than the one on which QuickMAP is installed, remember that the default directory for GEM's drive is 'GEMAPPS\GEMSYS'. This can affect relative path specifiers on that drive.

Leaving QuickMAP

You may exit QuickMAP from any of the modules by dropping the far left menu and clicking on 'Quit'. When you do so, the screen will be cleared as graphics mode is exited and the following messages will appear:

Remove QuickMAP's Environment and Return to DOS. . .

Number of installations: 1

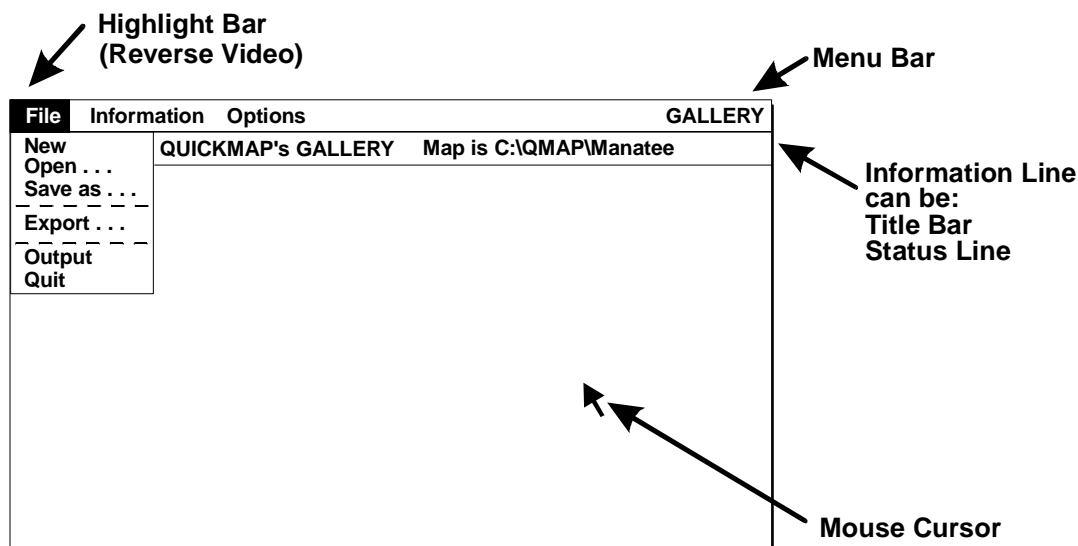
Press ENTER to remove, ESC to abort

When QuickMAP is started, it loads certain TSR (Terminate and Stay Resident) programs, such as tablet and mouse drivers. Pressing <ENTER> removes these, freeing up computer memory. If there are more than 1 of these installed, you may have to press <ENTER> more than once to return DOS to its original state.

The QuickMAP User Interface

Features of the QuickMAP interface, or graphic environment, include the pictures, symbols, display characteristics, and conventions that are used to establish and aid communication between QuickMAP and the user. The graphics management resources from GEM Desktop have been used to develop the graphics environment for QuickMAP. Some features that are common to GEM and QuickMAP, as well as some features unique to QuickMAP and its modules, are described and illustrated in this section to help acquaint you with QuickMAP's operation.

Below is an illustration of the QuickMAP Gallery screen. It is similar to a GEM display screen, and will be used to illustrate some features common to GEM and QuickMAP.



- **Menu Bar**

Line across the top of the display screen containing the names of dropdown menus that may be activated with the mouse cursor. Each menu contains a list of commands, or menu items, that initiate various operations.

- **Information Line**

Line beneath the Menu Bar that serves as either a Title Bar, as described for GEM features, or as a Status Line, as described for the individual QuickMAP modules.

- **Title Bar**

Line across the top of a GEM (and QuickMAP) window, beneath the Menu Bar, that identifies the drive, directory, "folder" or application, and file that is currently open.

- **Mouse Cursor**

One way in which the user communicates with GEM. Represented by an arrow on the screen, it is controlled by moving the mouse, or with cursor control keys. The mouse cursor will activate a dropdown menu when positioned over its name. Most often, the mouse cursor is used to select (or activate) a menu item or command or button. This is done by positioning the cursor over the object to be activated and clicking the mouse button. Although it is possible to run GEM with cursor control keys only (no mouse), don't bother!

- **Hourglass Cursor**

When the mouse cursor is replaced by an hourglass symbol, QuickMAP is busy changing something that affects the graphics environment. You must wait until it is finished before continuing use of the program. When QuickMAP is finished, the hourglass will be replaced by the original cursor symbol.

- **Pointing Hand Cursor**

When the mouse cursor changes to a "pointing hand", this indicates that the function keys are inactivated and cannot be used to replace mouse actions. In other respects (selecting, clicking), the hand cursor behaves just like the mouse cursor.

- **Highlight Bar**

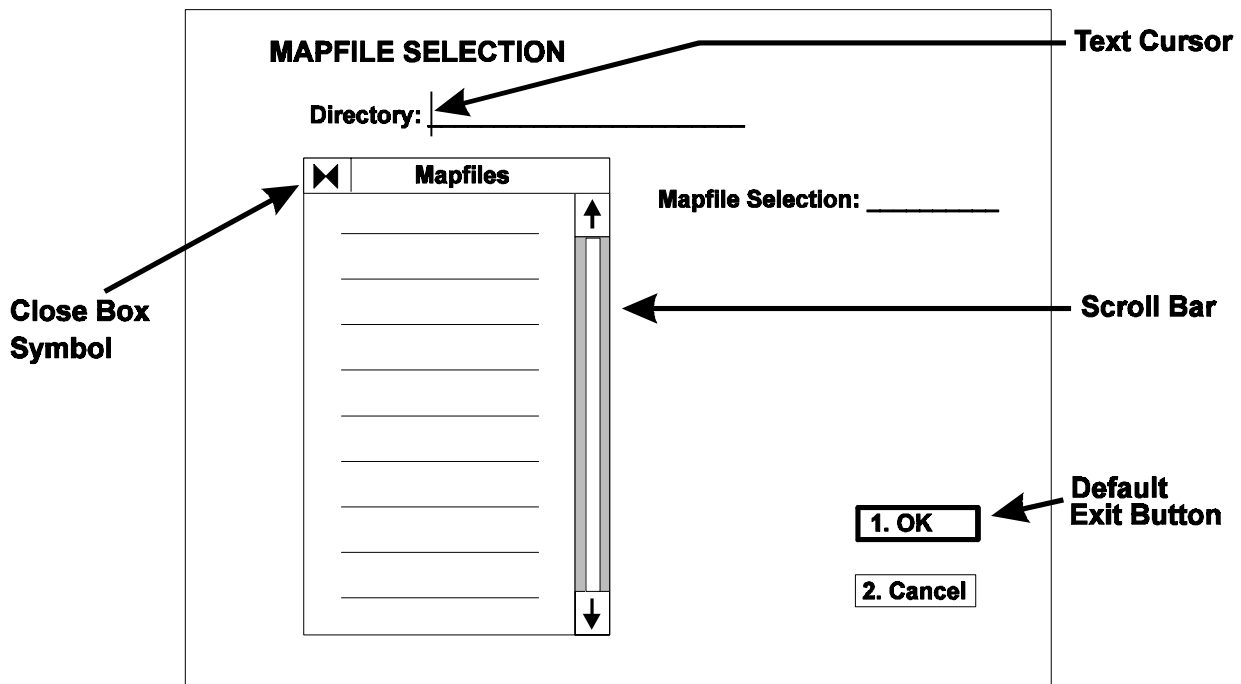
A reverse video bar used to indicate when a menu name, menu item, or button is selected or activated. The text is white on a black background.

- **Gray Text**

When a menu item or button selection appears in gray text, this indicates that the item is currently inactivated and cannot be selected by the user. An item is inactivated because it is not an appropriate selection for the immediate circumstances. For example, 'Insert Close' is inactivated until after 'Insert Before' has been selected.

- **Dialog**

Message displayed on the screen so GEM can provide information to you or obtain information from you. All dialogs contain at least one exit button, to remove the dialog from the screen. Information may be provided by the user by typing at the keyboard (see 'Text Cursor5') or by clicking on one or more buttons. An example of a QuickMAP dialog is shown below.



A QuickMAP DIALOG

- **Text Cursor**

A vertical bar that indicates the user may enter information in a field on a dialog. A text cursor may be moved to another data entry field by clicking within the new field. Other computer keys and their affect on editing with the text cursor include: left and right arrows move cursor one space left and right, respectively; downward arrow or Tab places the cursor in the next data entry field; upward arrow or Shift-Tab moves the cursor to the previous data entry field; Del deletes the character to the right of the cursor; backspace deletes the character to the left of the cursor; and Esc erases all characters from the current data entry field.

- **Scroll Bar**

Vertical bar containing a "slider" that is placed beside lists (MapID lists, Map Lists, etc.) to allow scrolling through the list. The relative size of the slider within the scroll bar indicates the relative amount of the total list that is currently displayed, and the position of the slider within the scroll bar indicates the relative position in the list. Clicking within the scroll bar moves the slider (and corresponding list) to the position where one clicks. Clicking on a scroll arrow (upward and downward arrows at the top and bottom of the scroll bar) moves the slider an amount equivalent to one display page per click.

- **Close Box Symbol**

Symbol shaped like a “bow tie”. (Refer back to the illustration of a QuickMAP dialog.) Clicking on the close box symbol closes the currently open file, folder, or directory and displays the next higher level (toward root directory) in the directory path. For example, in GEM the Title Bar might show ‘C:\GEMAPPS\PICTURES’ currently open. Clicking on the close box symbol would display ‘C:\GEMAPPS’ and all folders contained in that directory would be shown in the window. The final level attainable is a display of the drives available in your GEM installation. In the QuickMAP ‘MAPFILE SELECTION’ dialog illustrated above, the ‘Directory’ line might show ‘C:\QMAP\DATA’ currently open. Clicking on the close box symbol would display ‘C:\QMAP’. All the files and any subdirectories contained in the QMAP directory would be shown on the list.

- **Directory Open Symbol**

Diamond shaped symbol that appears to the left of a directory name in a list of names. Clicking on the symbol opens the directory and lists its contents.

- **Buttons**

Boxes that appear on dialogs, they are activated when the user clicks on them with the cursor. An ‘Exit’ button causes the dialog to be removed from the screen, and may also have other results such as implementing or cancelling the instructions on the dialog. Buttons also may be used for data entry. Often these are called “Radio” buttons, because clicking on one choice toggles other choices off. When a button has a thick border, it is the default choice and pressing the < Return> or < Enter> key on the computer keyboard is the same as clicking on the button. In QuickMAP, some buttons are automatically highlighted (in reverse video) when the dialog appears. These buttons are also defaults, and may be selected by pressing <Enter>.

ADD SETS IN TABLE

Enter arc name or select exit button

Set Type: **OUTLINE** HOLE LINES POINTS

for: **All Arcs** Each Arc

From Arc: _____ To Arc: _____

Direction: **NORMAL** REVERSED

1. More 2. Done 3. Cancel

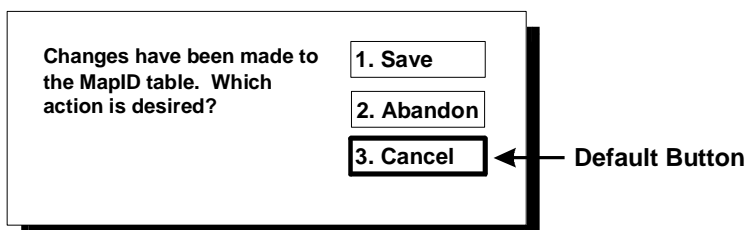
Radio Buttons

Exit Buttons

Example of a DIALOG

- **Alert**

A special type of dialog that alerts the user to possible consequences of an action about to be taken. For example, an alert might warn that the changes made to a mapID during an editing session are about to be lost, if the user selects 'Quit' without first saving the ID. The user must respond to an alert by clicking on an exit button before QuickMAP will allow him to continue.



Example of an ALERT, a type of dialog

- **Naming Conventions for QuickMAP**

Family name: 1-7 characters, letters only

Arc name: a family name followed by a number from 1 to 999

MapID name: 1-10 characters, including special characters with ASCII code numbers 33-122, except for *, ?, and ' ; beginning with a letter or special character, may include numbers.

Mapfile name: 1-8 characters, beginning with a letter, but may include numbers

All names in QuickMAP: upper and lower case are equivalent, only letters and numbers, no "special" characters, except as described for MapID names.

- **Size Limits**

Number of Points per Arc: 2048

Number of Arcs per Family: 999

Number of Holes per Outline: 200 for polygon fills; otherwise limited only by available disk space

Number of Sets per MapID: limited only by available disk space

Total number of Arcs: limited only by available disk space; however, a practical limit is 6550 arcs

Maximum polygon size: for polygon fills, depends on the amount of memory available, but probably not more than 4000 to 5000 points; otherwise limited only by available disk space

GALLERY Features

The graphics environment offered by QuickMAP's GALLERY includes the features described for the GEM and QuickMAP interface, plus some that are specific to GALLERY.

- **Menu Bar**

For GALLERY, the Menu Bar contains menu names 'File', 'Information', 'Options', and 'GALLERY'.

File	Information	Options	GALLERY
QUICKMAP's GALLERY		Map is C:\QMAP\Manatee	

- **Status Line**

The standard display for the GALLERY Status Line shows the title 'QUICKMAP GALLERY' and the drive, directory, and name of the currently open mapfile. Changes made by the user selecting menu commands will cause the Status Line to be updated.

DRAW Features

The graphics environment offered by QuickMAP's DRAW module includes the features described for the GEM and QuickMAP interface, plus some that are specific to DRAW.

- **Menu Bar**

For DRAW, the Menu Bar contains menu names 'Arc', 'Modify', 'View', 'Information', 'Options', and 'DRAW'.

Arc	Modify	View	Information	Options	DRAW
Mapfile: MANATEE	Arc: UNTITLED	Length: 0	Buffer length: 0		

- **Status Line**

The standard display for the DRAW Status Line shows the name of the currently open mapfile, the name of the currently open arc, the length of the currently open arc, and the length of the buffer. Data is stored in the buffer when an 'Insert Before' is in progress, and is shifted back out of the buffer when an 'Insert Close' completes the operation. The buffer is cleared by the 'New', 'Open', and 'Save/Next' menu commands and by exiting DRAW. Other changes made by the user selecting menu commands will cause the Status Line to be updated. The standard Status Line display is cleared and replaced by special instructions when the 'Insert Before', 'Delete with Cursor', 'Delete All Points', 'Delete Last Point', 'Window View', 'Zoom View', 'Shift View', or 'Find Point(s)' menu item is selected. When 'Draw Input Mode' is toggled to tablet input, the Menu Bar disappears and the Status Line becomes the top line on the display.

- **Defaults for DRAW**

Display view - 'World View', which is determined by mapfile extents unless changed by a 'Set World' menu command

Arc display color - black, for arcs 'Open'ed or digitized

- red, for overlayed arcs

- blue, for overlayed IDs

Display point symbol - * for first point digitized

- . (dot) for digitized points, except the first

- * for overlayed arcs and IDs

Directional arrows are shown when arcs are digitized onto the display. Coordinate values and tick display are off

- **Display Characteristics for DRAW**

The colors, symbols and markers used for specific menu commands in DRAW are:

Insert Before - black + to mark point of insertion

Delete with Cursor - red boxes mark the data points and ranges to be deleted

Delete with Keyboard - red boxes mark the data points and ranges to be deleted

Window, Zoom and Shift View - black + to mark limits; black solid line for window borders and to mark quadrants

Overlay - for overlayed arcs: red asterisks for point data, red lines for line data, and red hollow for polygons

- for overlayed IDs: blue asterisks for point data, blue lines for line data, and blue hollow for polygons

ASSEMBLY Features

The graphics environment offered by QuickMAP's ASSEMBLY module includes the features described for the GEM and QuickMAP interface, plus some that are specific to ASSEMBLY.

- **Menu Bar**

For ASSEMBLY, the Menu Bar contains menu names 'MapID', 'Modify', 'View', 'Information', 'Options', and 'ASSEMBLY'.

MapID	Modify	View	Information	Options	ASSEMBLY
Current ID: UNTITLED			Mapfile: MANATEE		Table Selected

- **Status Line**

The standard display for the ASSEMBLY Status Line shows the name of the currently open mapID, the name of the currently open mapfile, and whether 'Table', 'Set' or 'Arc' is currently selected. 'Set' and 'Arc' may be alternately selected and de-selected by clicking on a set header line or an arc name, respectively, in the MapID Table. 'Table' is selected by default when neither a set nor arc is selected. Selecting a particular set or arc is required prior to selection of certain commands from the 'Modify' menu. Other changes made by the user selecting menu commands will cause the Status Line to be updated. The standard Status Line display is cleared and replaced by special instructions when the 'Window View', 'Zoom View', 'Shift View' or 'Pick Arc/Set' menu item is selected.

- **MapID Table**

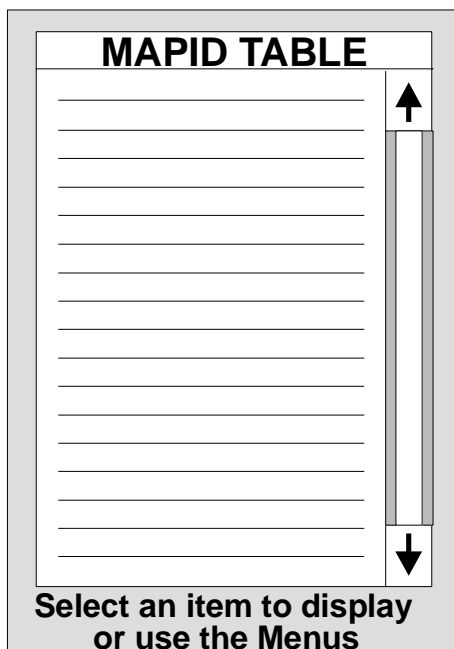


Table on the left third of the ASSEMBLY display window containing a list of the sets of arcs in the currently open mapID. A scroll bar is used to access lists longer than one display page. Each set in a mapID list is identified by a "header line" showing its topology and the number of arcs in the set. The set header line is followed by the individual arc names, one per line. The set or arc currently selected is "checked", ie., an arrowhead symbol appears to the left of the name. The sets and arcs on the list are affected by commands (menu items) selected from the 'MapID', 'Modify', 'View' and 'Options' menus.

- **Defaults for ASSEMBLY**

Display view - 'World View', which is determined by mapfile extents

Arc display color - black, for arcs currently listed on the mapID table and overlaid individual arcs

- red, for overlaid arcs that are part of an ID

Display point symbol - +, for arcs currently listed on the mapID table and for overlaid individual arcs

- x, for overlaid arcs that are part of an ID

Directional arrows are shown when arcs are drawn on the display

- **Display Characteristics for ASSEMBLY**

The colors, symbols and markers used for specific menu commands in ASSEMBLY are:

Overlay - for overlaid arcs: black + for points, black solid lines, and black with hollow fill style for polygons

- for overlaid IDs: red X for points, red solid lines, and red with hollow fill style for polygons

Window, Zoom, and Shift View - black + to mark limits; black solid line for window borders and to mark quadrants

Select Arc/Set - red + for point data; hollow, red for polygons to mark the selected arc or set. If red is the currently selected display color, green is used for 'Select Arc/Set'.

DISPLAY Features

The graphics environment offered by QuickMAP's DISPLAY module includes the features described for the GEM and QuickMAP interface, plus some that are specific to DISPLAY.

- **Menu Bar**

For DISPLAY, the Menu Bar contains menu names 'Map', 'Modify', 'View', 'Information', 'Calculate', 'Options', and 'DISPLAY'.

Map	Modify	View	Information	Calculate	Options	DISPLAY
Current Group: UNTITLED			Map List: UNNAMED		Mapfile: Manatee	

- **Status Line**

The standard display for the DISPLAY Status Line shows the currently selected Group, the currently selected Map List, and the currently open mapfile. Changes made by the user selecting menu commands will cause the Status Line to be updated. The standard Status Line display is cleared and replaced by special instructions when the 'Window View', 'Shift View', 'Zoom View', 'Area', 'Perimeter', or 'Distance' menu item is selected.

- **Map List**

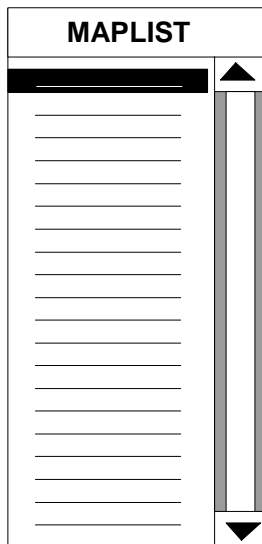
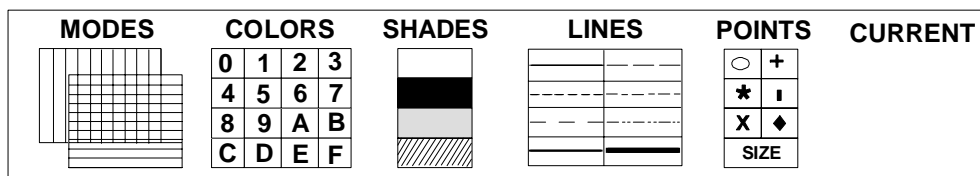


Table on the left side of the DISPLAY window containing a list of mapIDs. A scroll bar is used to access lists longer than one display page. The mapIDs on the list are affected by menu commands from the 'Map', 'Modify', 'View', and 'Calculate' menus. The name currently selected on the list is marked by the highlight, or reverse video bar.

- **Toolkit Panel**

Panel at the bottom of the DISPLAY window containing symbols for the display parameters that may be changed by the user.



The parameters are:

- 1) MODES, or writing modes, which may be toggled between 'Replace' and 'Transparent';
- 2) COLORS - one of sixteen may be selected for point data, lines, and/or polygons;
- 3) SHADES, which includes hollow and solid fill styles and seven dithers, fourteen patterns and twelve hatches;

4) LINES, of which there are six types and two widths; and

5) POINTS, for which there are six symbols and three sizes. (There is only one size for the dot symbol.)

Parameters are selected by clicking on appropriate symbols in the panel and on dialogs that are activated when some panel symbols are selected. The 'CURRENT' symbol at the far right of the Toolkit Panel summarizes the parameters in effect for the ID or Group currently selected in the Map List.

- **QMM File**

A Map List is saved as 'filename.QMM'. The .QMM file contains the mapID and Group names that make up a Map List, and information identifying the display parameters for each. The display parameters stored are those currently selected for each ID or Group when the list is saved. Parameters are stored only if they are different from default values.

- **Defaults for DISPLAY**

Display view - 'World View', which is determined by mapfile extents unless changed by a 'Set World' menu command

Arc display color - black

Display point symbol - . (dot), standard size

Fill style and color - hollow, black

Writing mode - transparent

Directional arrows - not shown

Ticks - not shown

- **Display Characteristics for DISPLAY**

The colors, symbols and markers used for specific menu commands in DISPLAY are:

Area - for polygons, a color complementary to the one currently being used delimits the area calculated

- for total area, no change

Perimeter - for polygons, a color complementary to the one currently being used delimits the perimeter calculated

- for total perimeter, no change

Distance - for Airline, a blue dotted line delimits the calculated distance

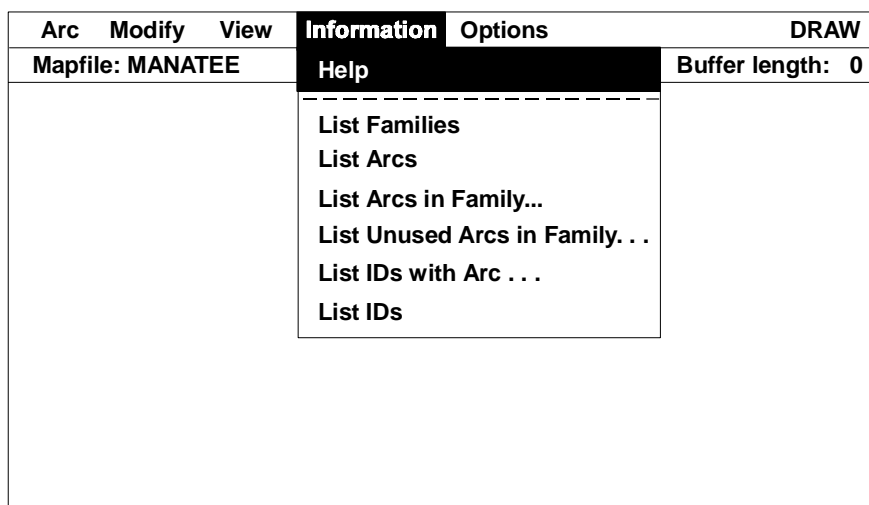
- for Along Line, a color complementary to the one currently being used

All of the above use blue + for delimiters selected by user

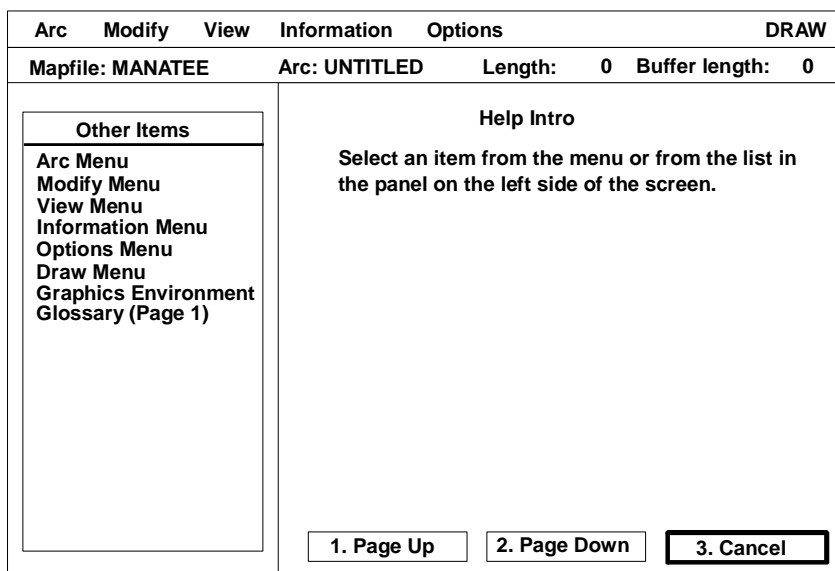
QuickMAP's On-Line HELP

QuickMAP's on line help provides descriptions of how all menu items work, access to a glossary of mapping terminology, and useful cross references to related QuickMAP menu items and operations. An example using QuickMAP's on line Help in the DRAW module will illustrate how Help works for all of QuickMAP. The DISPLAY, ASSEMBLY, and GALLERY modules also have on-line Help.

From the GALLERY, activate the 'GALLERY' menu and click on DRAW. Once in DRAW, activate the 'Information' menu by pointing to its name with the mouse cursor. When the menu drops down, activate 'Help' (it appears in reverse video) and click on it.



The QuickMAP help screen looks like the one illustrated below. The 'DRAW' menu bar (top line) and the status line will remain on the display above the help screen. Notice that the mouse cursor has been replaced by a "pointing hand".

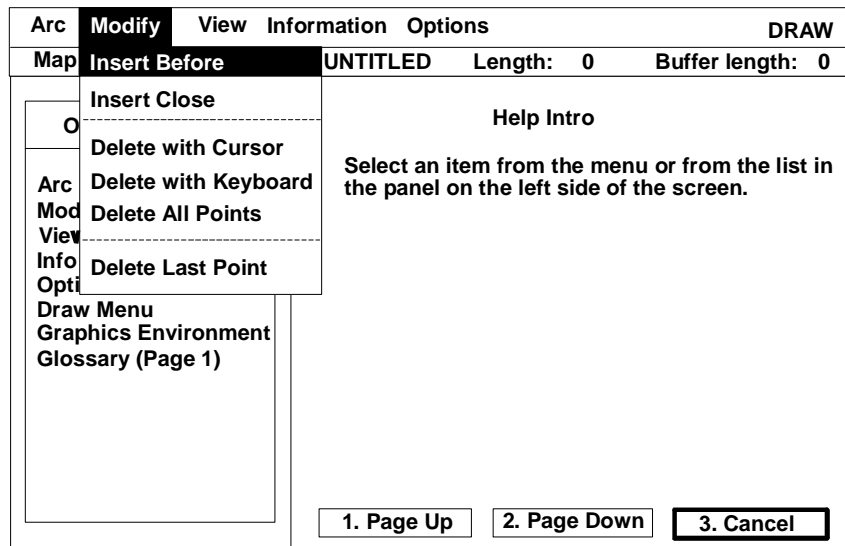


When the "hand" is present on the display, the function keys are inactivated, and cannot be used as an alternative to clicking with the mouse cursor.

There are two sources of 'Help' information on the help screen. The first is the list currently entitled 'Other Items' at the left, and the second is the menu bar across the top.

To illustrate use of the menu bar as a source of information, activate the 'Modify' menu by pointing to its name on the top line. When the menu drops down, activate and click on 'Insert Before'.

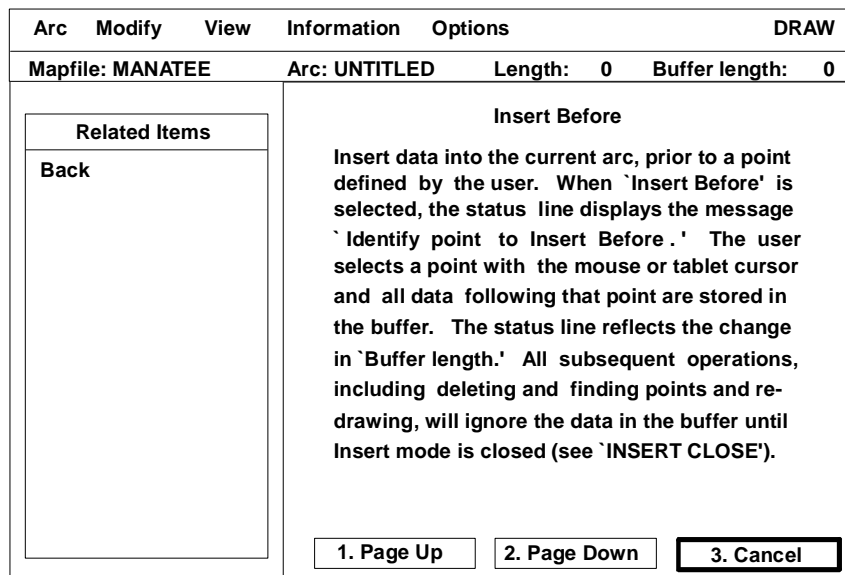
An explanation of how 'Insert Before' works will appear on the right half of the display. If a description requires more than one screen of text, the buttons at the bottom may be used to page up and down through the information.



Notice that the list on the left is now entitled 'Related Items'. When there are other menu items or information that may aid in understanding the description currently on the screen, these items will appear in the 'Related Items' list. You may click on any that appear helpful, and a new screen of information will appear.

Note also that the top entry in the 'Related Items' list will always be 'Back'. Selecting 'Back' from a dropdown menu item will return you to the initial QuickMAP help screen. Selecting 'Back' from an item in the list on the left-hand panel will take you back to whatever item was previously selected. We will look at an example of this below.

Finally, clicking on the '3. Cancel' button (or pressing mouse button number two) at any time will exit 'Help' and return you to the place in QuickMAP from which you entered Help.



Right now, click on 'Back' in the 'Related Items' list. This will return you to the initial help screen.

As an example of the 'Items' list as a source of help, click on 'Arc Menu' in the 'Other Items' list. A description of the DRAW 'Arc' menu will appear in the text area on the right side of the screen.

Now, click on 'Back' to return to the initial help screen.

Arc	Modify	View	Information	Options	DRAW
Mapfile: MANATEE		Arc: UNTITLED		Length: 0	Buffer length: 0
<div>Related Items</div> <div>Back</div>			<div>Arc Menu</div> <p>Moving the mouse cursor over 'Arc' in the menu bar at the top of the screen in the DRAW module activates a dropdown menu from which the user may select operations affecting arcs. A menu item is selected by clicking on its name in the dropdown menu on the computer display, or by digitizing on its name on the paper menu if in tablet mode. The choices in the 'Arc' Menu are: 'New', 'Open', 'Append', 'Save / Next', 'Save as', 'Delete', 'Abandon', and 'Quit.' 'Help' for the individual menu items provides detailed descriptions of how the selections work.</p> <div> <div>1. Page Up</div> <div>2. Page Down</div> <div>3. Cancel</div> </div>		

To demonstrate the use of 'Back' in an 'Item' list, first click on 'Glossary (Page 1)' in the 'Other Items' list. The text area (on the right) will display an introductory first page for the QuickMAP glossary. You may now click on any of the terms listed under 'Related Items' and a definition of that term will appear on the information screen. Or you may click on 'Glossary (Page 2)' and the second page, continuing the list of glossary terms, will be displayed. Click on 'Glossary (Page 2)' now.

Next, click on 'Back', at the top of the 'Related Items' list. Doing so will return you to the previous screen; in this case, to 'Glossary (Page 1)'. QuickMAP can trace backward through the item information screens to ten levels; after ten 'Backs', it will return to the initial help screen.

Arc	Modify	View	Information	Options	DRAW
Mapfile: MANATEE		Arc: UNTITLED		Length: 0	Buffer length: 0
<div>Related Items</div> <div> Back Alert Arc Attribute Base Parallel Central Meridian Control Buttons Dialog Digitize Dropdown Menu Easting Family Feature Hole Mapfile Map Projection Map Registration Glossary (Page 2) </div>			<div>Glossary (Page 1)</div> <p>Click on an item in the Related Items column</p> <ul style="list-style-type: none"> - for a description of that item or - to advance to the next page of Glossary items available <div> <div>1. Page Up</div> <div>2. Page Down</div> <div>3. Cancel</div> </div>		

Whenever you wish to leave 'Help', select the 'Cancel' button at the bottom of the screen or click mouse button two.

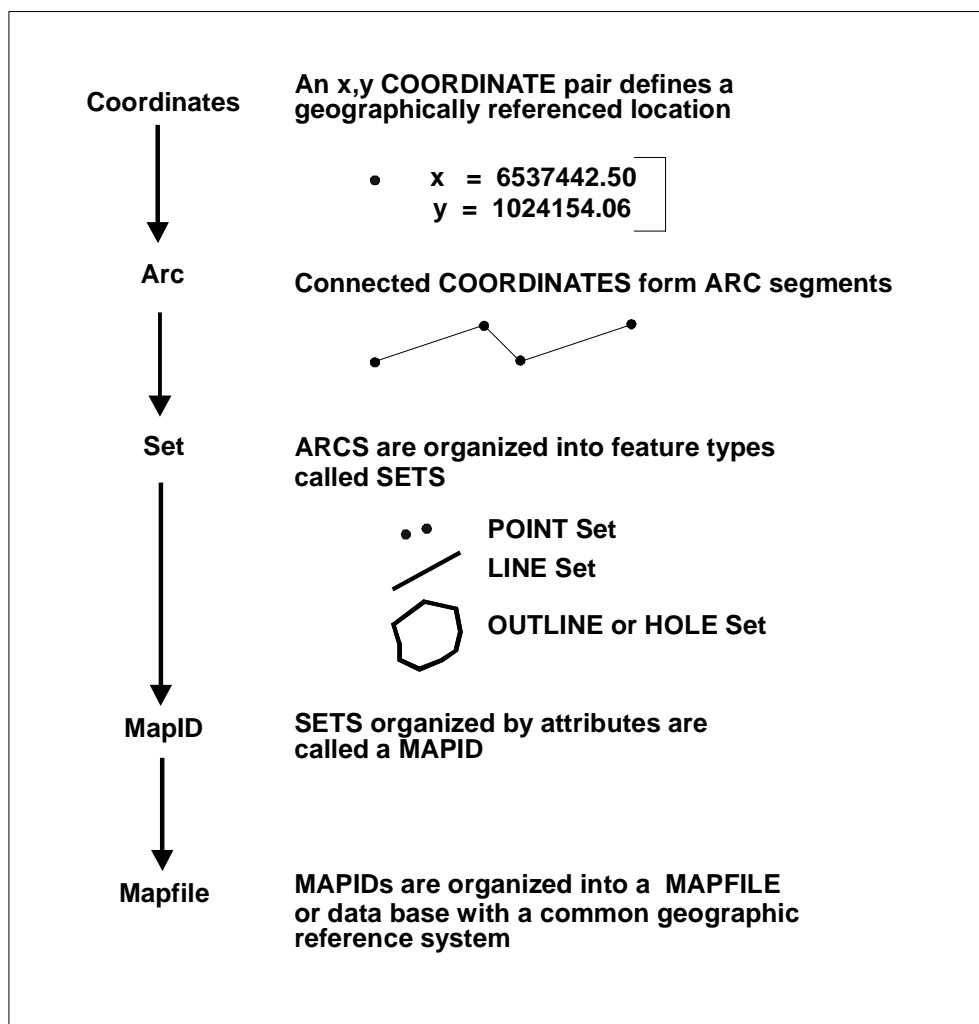
QuickMAP on-line help is also available in digitizing tablet mode. Simply digitize on 'Help' on the QuickMAP paper digitizing menu. An alert will appear, announcing that input mode is being changed to the screen. Digitize on 'Choice 1' at the bottom of the paper tablet menu (which is like clicking on '1. OK' on the alert). The QuickMAP help screen will appear on the display and control will be transferred to the mouse cursor and keyboard. Then 'Help' may be used as described above. When you select 'Cancel' to exit 'Help', an alert will announce that control is being transferred back to the tablet.

**Input mode will be changed
to Screen Input**

1. OK

Data Structures Used by QuickMAP

The following figure summarizes the hierarchy of data structures used by QuickMAP.



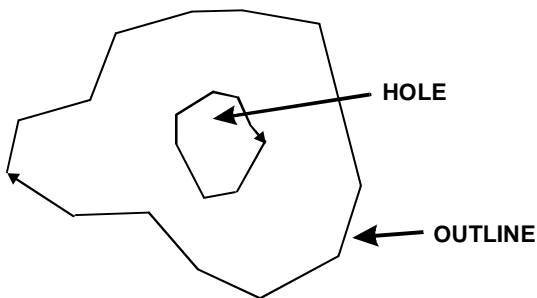
QuickMAP uses a vector representation for map information. Thus, x,y COORDINATES are the basic data elements and are used to define Point, Line, and Area features. In QuickMAP, the x,y coordinate records are organized as ARCS, and an arc record may contain up to 2048 coordinate pairs. Each arc is assigned a name consisting of an alphabetic part and a numeric part. The alphabetic part is referred to as the "Family name" and may be 1 to 7 characters in length. The numeric part must be in the range from 1 to 999.

ARCS in the WATER FAMILY
 Water1, Water2, . . . Water999

As illustrated in the data organization figure on the preceding page, ARCS are organized into feature types called SETS. These feature types include POINTS, LINES, and OUTLINES or HOLES. In terms of vector representation, POINTS may be thought of as vectors with no magnitude or length. As such, the order in which they are displayed is arbitrary. In QuickMAP, more than one point may be stored in a single arc record.

LINES are made up of two or more coordinate pairs connected in a specific direction. The direction becomes especially important when two or more line segments are connected together; incorrect order of display affects both the appearance and length of the total feature.

An Area feature, or OUTLINE set consists of three or more coordinate pairs connected so that the line they form closes upon itself. In addition, an area feature may contain another outline



within its boundary. Such an area, while appearing "inside" the boundary, is actually excluded from the outside polygon's area and is called a HOLE. In QuickMAP, the coordinate pairs making up OUTLINES are connected in a clockwise direction; those making up HOLES are connected counterclockwise.

The information describing a point, line, or area feature and its relationship to other features is called Topology. Set topology is organized by attribute to form a MapID Table. "Attribute" is used here to identify a particular characteristic of a group of map features, such as "wetland" or "upland". A MapID name may be up to 10 characters in length.

Finally, mapIDs are organized into a QuickMAP MAPFILE, or database.

This data hierarchy is reflected in the design of the QuickMAP software, each module working with specific data structures. The DRAW module allows the entry of COORDINATE values and the creation and editing of ARCS. The organization of arcs into SETS and of sets into MAPIDS is accomplished in the ASSEMBLY module, where mapID tables may be created and edited. In DISPLAY, Maps are created by associating mapIDs and assigning display attributes to them. QuickMAP's GALLERY provides operations that affect entire MAPFILES, including Creating, Opening, Closing, and assigning measurement units and projection parameters.

The information comprising a QuickMAP mapfile is contained in a set of four files, sharing the same file name but with the extensions .QMA, .QMI, .QMT, and .QMV.

The .QMA, or QuickMAP Arc index file contains a list of all the arcs in the mapfile and pointers to the .QMV file. Variable Data Records for all the arcs are stored in the .QMV file. A variable data record gives an arc's name and record length, the number and names of mapIDs with which it is associated, and the number and a listing of the coordinates comprising the arc. The .QMA and .QMV files, because they contain information about arc records, are modified by QuickMAP's

DRAW module. The .QMI, or QuickMAP ID index file has a list of all the mapIDs in the mapfile and a pointer to each ID in the .QMT file. Contents of the .QMI file are altered by the ASSEMBLY module. The .QMT file contains "header" information for the entire mapfile, including when and under which QuickMAP version the mapfile was created; the MBR (minimum bounding rectangle), scale, and measurement units; and projection information. In addition, the .QMT file has the detailed information necessary to completely describe all the mapIDs and, thus, the topology belonging to the mapfile. It also contains pointers to arcs in the .QMV file. The .QMT file is modified mainly by the ASSEMBLY module. QuickMAP's DISPLAY module does not alter any of the files comprising a mapfile.

Another type of file used by QuickMAP has a filename selected by the user and the extension

Banana 3 7

GROUPS

WaterG FS= 16 FC= 4

LandG FS= 3 FC= 11

Mortality--Boats, Barges MT= 4 MC= 2

MAPIDS

Diane

Gyro

Land Group= LandG

Mortbb Group= Mortality--Boats, Barges

Mortoth MT= 3 MC= 3

Studyarea

.QMM. A .QMM file is written by the DISPLAY module, and contains information describing a MAP. A Map is a collection of mapIDs along with display attributes, such as colors, shading, and point symbols assigned by the user. The IDs in a Map may also be organized into GROUPS that share display attributes in common. An example of a .QMM file is shown at left.

The first line gives the name of the mapfile ("Banana" in the example) followed by the number of Groups

(3) and the number of IDs (7) in the Map. Next is the word 'GROUPS' and a one-per-line listing of the Group names, each with optional (non-default) display attribute assignments. A Group name may be up to 25 characters in length. If it is shorter, the field is padded to a total of 25 with blank spaces and the display attribute assignments begin in space 26. In the example, the three Groups are "WaterG", "LandG", and "Mortality--Boats,Barges". The first Group is named "WaterG" with attribute assignments of a particular pattern for Fill Style ("FS=16") and blue for Fill Color ("FC= 4"). After all the Group listings comes the title "MAPIDS" followed by a

one-per-line listing of the mapIDs with their Group or attribute assignments. In the example, the "Land" ID contains the Group "LandG". The attribute assignments given for "LandG" in the GROUP listing would be applied to the entire "Land" mapID. The "Mortoth" ID has no Groups, but has attribute assignments of an asterisk for Marker Type ("MT= 3") and green for Marker Color ("MC= 3"). If no attribute assignments are given after a Group or MapID name, default values are applied. Charts showing the codes for attribute assignments are at the end of this section. A .QMM file may also be created using a text editor. It is simply an ASCII text file with the format described above. There is more information about Groups in the 'Make Group', 'Show Group', and 'Clear Group' descriptions under DISPLAY Menus, 'Modify Menu' in Chapter 4 of this manual.

"Background" files are also written by the DISPLAY module. These have the extension .BK?, where the ? is a C, E, V or H for the CGA, EGA, VGA or Hercules graphics card installed for QuickMAP, . Each .BK? file stores a bit image of a DISPLAY workarea designed by the user. Such a file may be used to quickly recall a background image to the screen while working in DISPLAY. For more information on the creation and use of .BK? files, see the 'Save View' and 'Load View' menu descriptions under DISPLAY Menus, 'View Menu' in Chapter 4 of this manual.

Output files with the .GEM extension may be written by either the ASSEMBLY or DISPLAY module. These are special "metafiles" containing the information from a MapID Table (for ASSEMBLY) or a Map List (for DISPLAY) in a form that can be sent to any output device installed for GEM, such as computer screen, printer or plotter. The 'Output' menu descriptions for the 'MapID Menu' in ASSEMBLY Menus and the 'Map Menu' in DISPLAY Menus (Chapter 4) tell how to create and use QuickMAP .GEM files.









Note that the .QMM, .BK? and .GEM files are separate from the files comprising a QuickMAP mapfile. Thus, altering one of these files does not change the associated mapfile and changing a mapfile does not cause these files to be altered.

Display Attributes




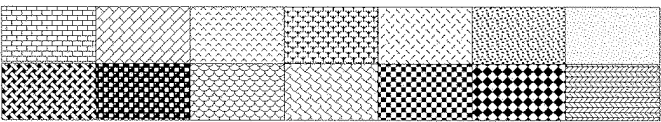
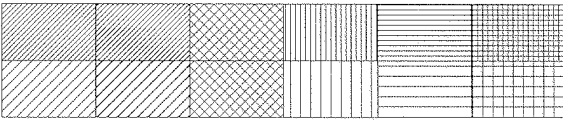
	Keywords	Default Settings	Value
Marker size	MS	small	11
Marker type	MT	dot	1
Marker color	MC	black	1
Line type	LT	solid, thin	1
Line color	LC	black	1
Mode	FM	transparent	2
Fill style	FS	hollow	0
Fill color	FC	black	1

Color	Value
White	0
Black	1
Red	2
Green	3
Blue	4
Cyan	5
Yellow	6
Magenta	7
White	8
Black	9
Dark red	10 (A)
Dark green	11 (B)
Dark blue	12 (C)
Dark cyan	13 (D)
Dark yellow	14 (E)
Dark magenta	15 (F)

Writing Mode	Value
Replace	1
Transparent	2

Line Type		Value
Solid		1
Long dash		2
Dot		3
Dash, dot		4
Dash		5
Dash, dot, dot		6
Medium		9
Thick		11

Marker Type		Value
Dot	•	1
Plus	+	2
Asterisk	*	3
Square	□	4
Diagonal cross	X	5
Diamond	◇	6
Marker Size		
Small		1
Medium		2
Large		3

Fill Style		Value
Hollow		0
Dithers		1-7
Solid		8
Patterns		9-16 19-24
Hatches		25-36

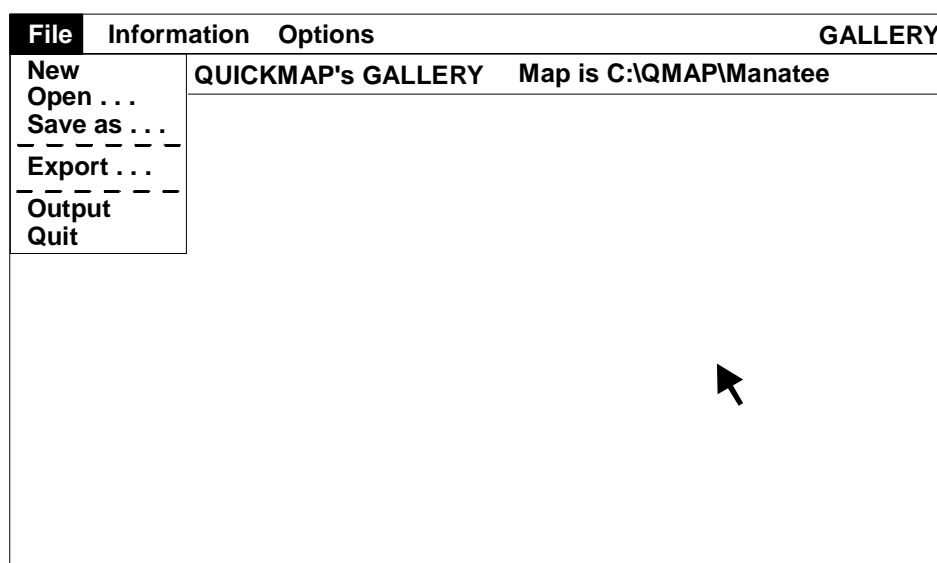
An Overview and Tour of QuickMAP's Operation

A Look in the GALLERY

QuickMAP provides a friendly interface by allowing user interaction with 'Dropdown Menus', 'Dialogs', and 'Alerts'. Getting into QuickMAP the first time will demonstrate how the process works. To start QuickMAP, from the DOS prompt enter

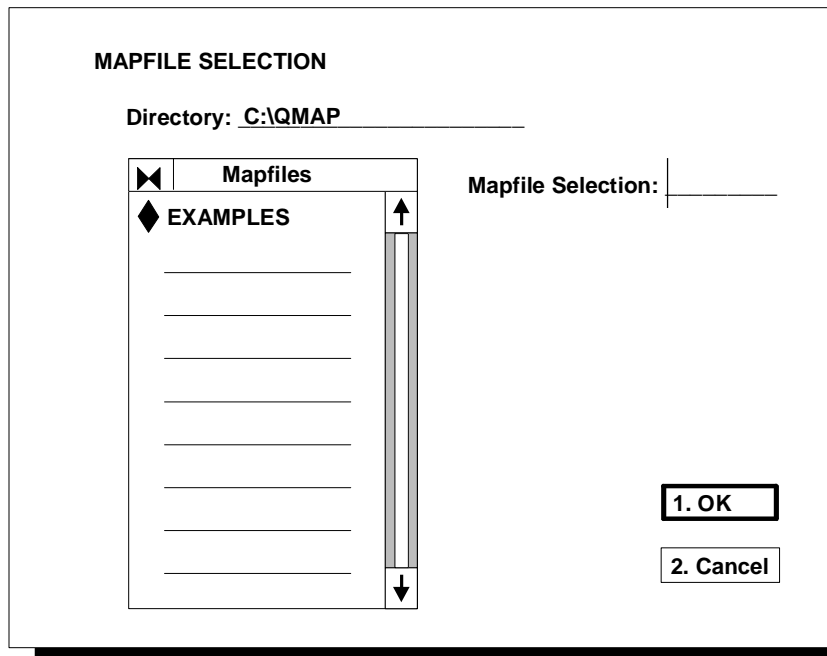
QM

The first screen that appears in QuickMAP is the GALLERY, from which the user can enter other modules of QuickMAP, such as DRAW (to enter data), ASSEMBLY (to assemble digitized arcs into topographical features), and DISPLAY (to compose map displays). Across the top of the Gallery screen are the names of four menus - File, Information, Options, and GALLERY.



To open a mapfile:

1. Move the mouse cursor over the 'File' menu name. The name will be highlighted to show that it has been selected, and a Menu with several items will drop down.
2. Move the mouse cursor over 'Open...' on the menu. Again, the name will be highlighted. While the cursor is positioned over 'Open', click the mouse button to select 'Open'. (If your mouse has more than one button, use the first or left-most button.)
3. A Dialog entitled 'MAPFILE SELECTION' will appear. Dialogs allow you to enter information by typing at the keyboard and/or with the mouse.



4. The 'Directory: _____' line shows the current disk and directory. If you wish to change it you may:

a) Click on the name entered on the 'Directory:____' line. A vertical line (the 'text cursor') will appear to the right of the directory name. You can erase the whole line by pressing the escape key, erase one letter at a time with the backspace key, or skip over letters with the arrow keys. When you have typed in the new directory (including path) that you want, either press <Enter> or click on button '1.OK'.

OR

b) Click on the 'bow tie' shaped symbol at the upper left of the Mapfiles table. This will close the current directory, move to its parent directory, and give you a list of other available directories and mapfiles from which selections can be made.

OR

c) Position the mouse cursor over the directory name (identified with a "diamond") that you wish to select from the list. When you click on the name, it will appear briefly in reverse video, be entered on the 'Directory' line, and be opened to show the subdirectories and mapfiles it contains. If you installed the sample mapfiles with QuickMAP, you should have an EXAMPLES subdirectory. Click on its name in the Mapfiles table to list the sample mapfiles.

5. Pressing <Enter> moves the text cursor to the 'Mapfile Selection: _____' field. You may:

a) Type in the name of the desired mapfile, using the backspace and arrow keys to make corrections as before. Then press < Enter> or click on '1. OK'.

OR

b) Click on a mapfile name in the list on the Mapfiles table. As with the 'Directory' name, it will be highlighted and will be automatically entered on the 'Mapfile Selection' line. As an example, click on COLOBAT. Then press <Enter> or click on '1. OK' to open that mapfile.

Another way to open a mapfile is by including a parameter on the command line when starting QuickMAP. Chapter 2 in this manual explains how to enter QuickMAP using mapfile and module parameters on the command line.

When you click on 'OK' to open a mapfile, the MAPFILE SELECTION dialog will be cleared and you will be returned to the GALLERY screen. The name of the mapfile you selected (along with correct drive and directory) will appear on the line below the menu names. This is also known as the Status or Information Line.

Now drop the 'Information' menu by moving the mouse over its name and click on 'Mapfile Info'. A dialog will appear describing the currently open mapfile (COLOBAT.) The information provided includes the date the mapfile was created, its size in bytes, the projection, scale and coordinate units, the number of arcs and IDs it contains, and locational coordinates. To leave the MAPFILE INFO dialog, click on '1. OK'. Other menu items in the GALLERY execute commands that affect the currently open mapfile, such as defining its projection and selecting units of measurement or re-setting the default "world view." See the individual menu item descriptions in part four of this manual for details on how these commands work.

If you wish to continue in QuickMAP, after a mapfile is opened, go to the GALLERY menu and click on 'DRAW', 'ASSEMBLY', or 'DISPLAY' to enter one of the QuickMAP modules. A mapfile must be open before you enter another module. Or you may leave QuickMAP by clicking on 'Quit' in the 'File' menu. This will exit graphics mode and, when you press <Enter> in response to the message, will clear memory for use by other applications.

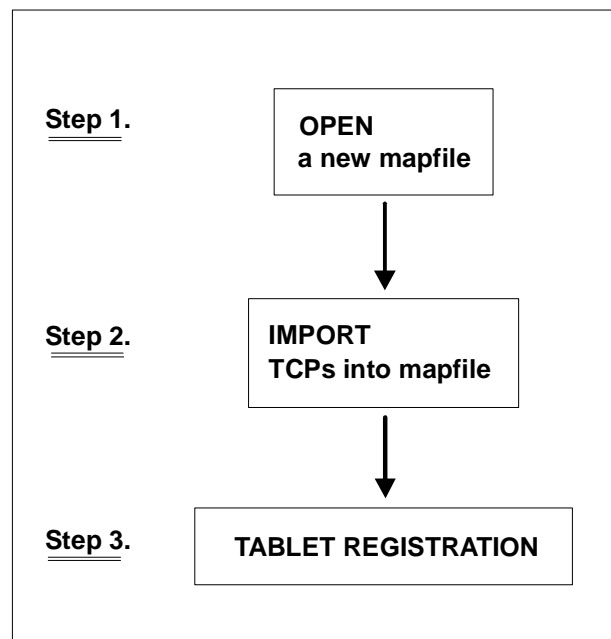
How to Create a Geographic Database

Data may be entered into a QuickMAP mapfile, or database, a number of ways. Data files from other sources can be imported into a QuickMAP mapfile if they are in the proper format. (See the section entitled 'Formats Supported by QuickMAP' in Chapter 5 of this manual.) Selected arcs may be exported from an existing QuickMAP mapfile, perhaps combined with others from some other source, and imported back into QuickMAP to form a new mapfile. Of course, arcs may also be entered directly into a mapfile as they are digitized using QuickMAP's DRAW module.

The QuickMAP package includes some "utility" programs that allow you to reproject coordinate data between several projection systems, to import data into a QuickMAP mapfile, and to export individual arcs, families of arcs, or mapIDs out of a QuickMAP mapfile. By way of a few examples, we will illustrate how the utilities may be used to help build QuickMAP databases (mapfiles).

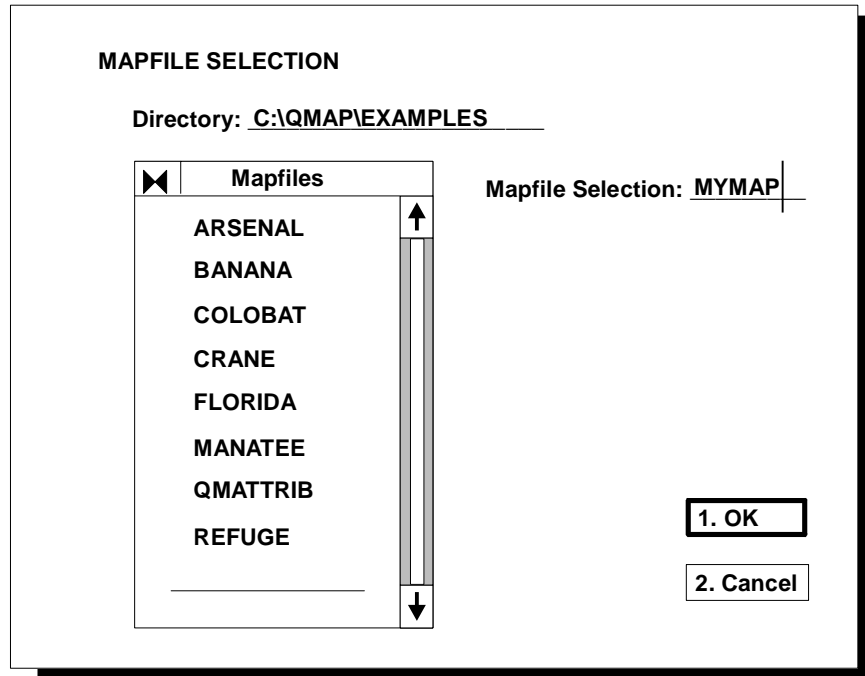
There are no dropdown menus, mouse cursors, or dialogs in the utility programs; user interaction is by typing at the keyboard. For this section, instructions and information from the computer program will be shown in *italics*. Entries to be made by the user will be shown in **BOLD CAPITAL LETTERS**.

First, we will illustrate some necessary steps in preparation for adding arcs to a mapfile by digitizing. A place to store the data is first reserved by creating a new mapfile. Then Target Control Points (TCPs) to reference our mapfile to the real world must be imported into the mapfile. We will also import some previously digitized data from another source. Finally, just before actually digitizing new arcs into the mapfile, a tablet registration will establish the relationship between points on the digitizing tablet and geographic locations on the earth.

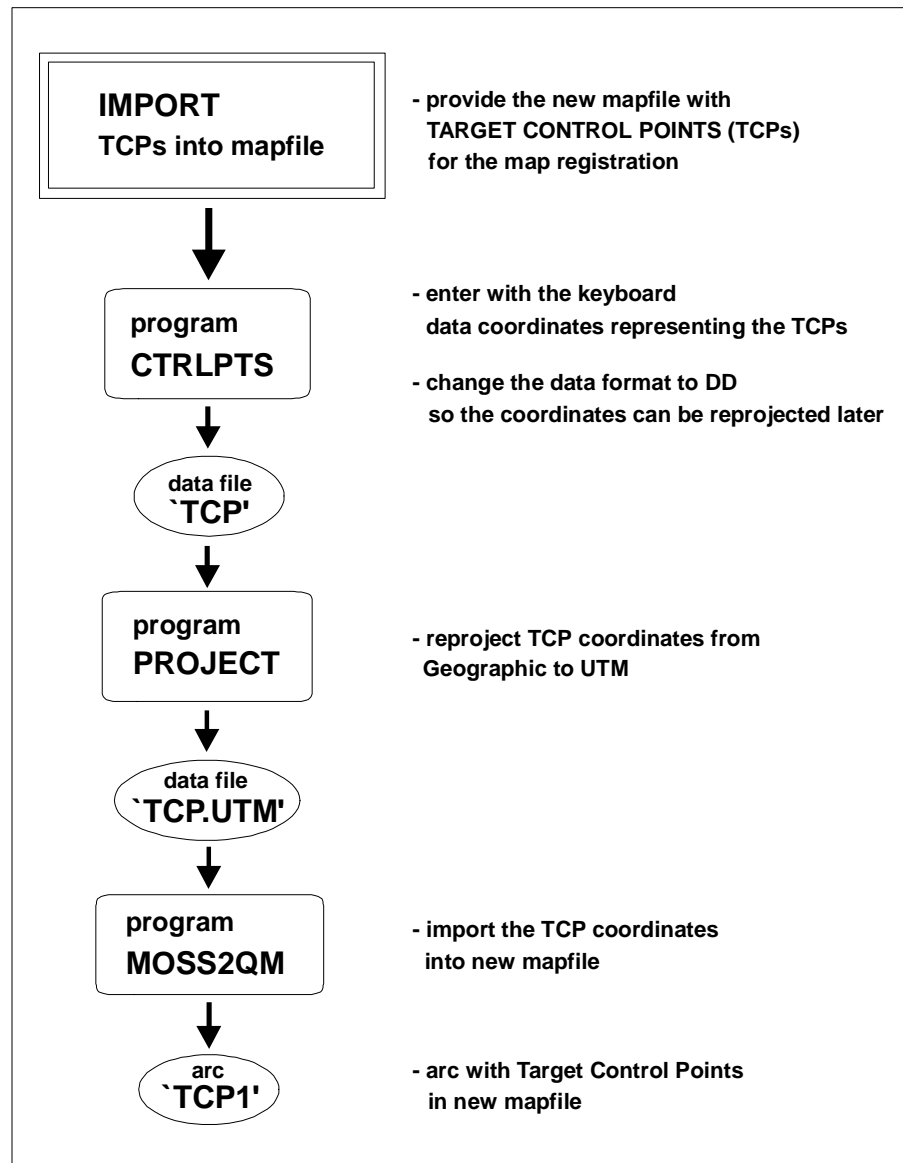


Step 1. OPEN a New Mapfile

The arcs we will digitize could be entered into an already existing mapfile, but for this example, we will create a new mapfile. First, get into the QuickMAP GALLERY. Activate the 'File' menu and select 'New'. When the MAPFILE SELECTION dialog appears, open the EXAMPLES subdirectory if necessary by clicking on its name in the list. Position the cursor in the 'Mapfile Selection' field and enter a name for the new mapfile, for example, 'MYMAP'. Press <Enter> or click on '1. OK'. (If a name is on the 'Mapfile Selection' line from a previous exercise, erase it by pressing <Esc> and then enter the new name.) The computer may be busy for a few moments creating the files QuickMAP needs for a mapfile. Then the dialog will disappear and the status line will show 'C:\QMAP\EXAMPLES \MyMap', or the appropriate drive\directory\mapfile name for your setup. (See 'A Look in the Gallery', pages 1-3 of this chapter, for complete instructions on entering the GALLERY and using the MAPFILE SELECTION dialog.)



For Step 2 of this section, we will use some of the QuickMAP utilities accessed via QMUtil to enter TCPs into the new mapfile. So exit QuickMAP by selecting 'Quit' from the 'File' menu.



Step 2. IMPORT TCPs into mapfile

As a learning tool, we will use the sample map sent with the QuickMAP package and located at the back of the User's Manual. It is a portion of a 7.5 minute series USGS map of the Vero Beach (Florida) Quadrangle and should be taped to your digitizing tablet. For QuickMAP to recognize the location of the sample map, you will have to perform a 'Tablet Registration'. Some preparatory steps should be completed before the actual registration.

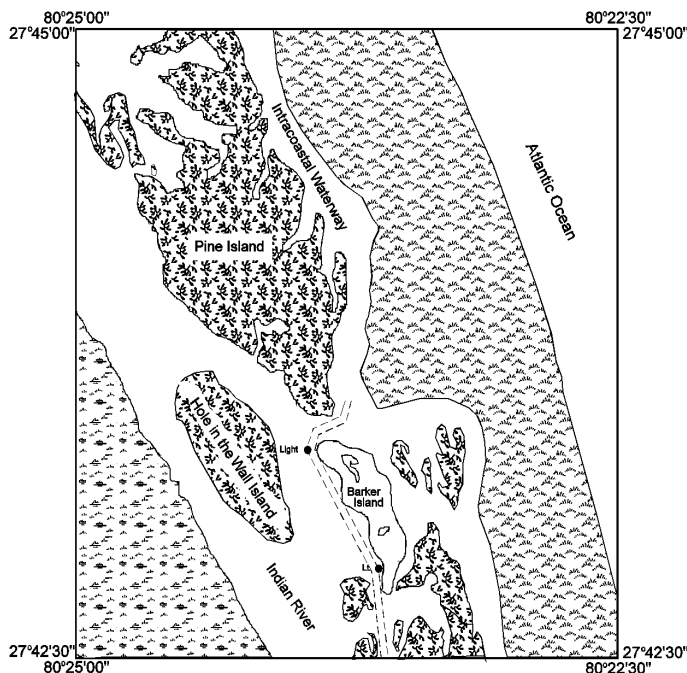
First, you should make sure that your digitizing tablet is connected to the computer and installed properly for QuickMAP. For some help with this, see the section on installing QuickMAP in Chapter

1 and be sure to run TABLOOK, the check tablet utility.

Next, we want to be sure our new mapfile contains an arc that will provide Target Control Points for the tablet registration. The border of the sample map would provide this information. Therefore, we need to import data consisting of four sets of coordinates that represent the four corners of the sample map.

In addition to the TCPs, we will also be importing into the mapfile some previously digitized data that are in the Universal Transverse Mercator (UTM) projection and we want the projection of

the data and TCPs to match. The TCPs happen to be geographic coordinates, and are represented in a “degrees, minutes, decimal seconds” (DMS or DD,MM,SS.S) format. We will use the PROJECT utility to reproject the coordinates from geographic representation to the UTM projection. The PROJECT program, however only accepts data in a decimal degrees (DD) format, and requires that any longitudes in the western hemisphere be represented as negative values. So first you must use a program called CTRLPTS to change the data from DMS to DD format. Then the TCPs may be reprojected to UTM. Finally, you may use the MOSS2QM utility to get the four coordinate pairs into the new mapfile. The flow chart on the preceeding page summarizes the process.



program

CTRLPTS

Convert DMS format to DD format

As shown on the flow chart on the previous page, the first step for entering TCPs in the mapfile is to run the utility 'CtrlPts.' Starting from the DOS prompt in the QMAP directory, type QMUTIL. Select the 'ENTER/CHANGE' option (the fourth) on the first menu that appears by using the downward arrow key to move the blinking cursor until option four is highlighted and pressing <Enter>. Then select the first option ('Create a MOSS Export File with Geographic Control Points') on the next menu to run 'CTRLPTS'. For more information on how to use QMUtil and the QuickMAP utilities, see part 5 of this manual.

The computer screen will display a message giving instructions for how to enter your data. Then,

Point 1 Longitude?

You type:

80,22,30 (and press <Enter>)

'Latitude?'

Enter:

27,42,30

So you end up with this:

Point 1 Longitude? 80,22,30 Latitude? 27,42,30

This pair of coordinates defines the lower righthand corner of the sample map, as illustrated on the previous page. The program will continue to prompt you for Longitude and Latitude values for Point 2, Point 3, etc. Enter the following to define the other three corners of the sample map (proceeding in a clockwise direction from the lower right corner):

Point 2 Longitude? 80,25,00 Latitude? 27,42,30

Point 3 Longitude? 80,25,00 Latitude? 27,45,00

Point 4 Longitude? 80,22,30 Latitude? 27,45,00

Point 5 Longitude? press <Enter>

Message displayed:

4 coordinates entered.

**Enter file name to save as decimal degrees
in a MOSS export format C:\QMAP**

Use the right arrow key to skip over to the end of the default path and type EXAMPLES\ so we can keep all the files in the same directory as the mapfile. Then enter a file name that conforms to DOS standards and that reminds you of the file contents. For example, enter:

TCP

Message displayed:

4 coordinates written to file C:\QMAP\EXAMPLES\TCP

You are finished with CTRLPTS. Your four coordinate pairs have been converted to DD format and any longitudes in the western hemisphere have been changed to negative values.

You will be asked if you want *More Utilities?* Since the next step to enter TCPs into our mapfile requires use of another utility, 'PROJECT', select Y(es) by pressing <Enter> and you will be returned to the QMUtil ENTER/CHANGE menu.

program
PROJECT

Reproject coordinates from geographic to UTM

If you are continuing from the previous section, select the fourth option (CHANGE a MOSS Export File's Projection') from the ENTER/CHANGE menu.

A message will appear:

Enter input MOSS export file: C:\QMAP

Edit the default path to add the EXAMPLES subdirectory and enter the file name

TCP

to reproject the MOSS Export file containing your 4 coordinates. (The file that was written by the CTRLPTS utility is in a "MOSS Export" data format). Next you will be asked to

Enter output MOSS export file: C:\QMAP\EXAMPLES

TCP.UTM

is a good name to reflect that your TCPs will be reprojected to the Universal Transverse Mercator system. A menu of the map projections available is displayed, and you are asked to enter a Source projection. Enter:

0

for geographic, since your TCPs are currently latitude/longitude coordinates. You are asked to enter a Destination projection. Enter:

1

for Universal Transverse Mercator, to match the projection of the extra data that will be imported. Requests for projection parameters will now be displayed. For this example, answer as shown below. For more detail on this and other projections, see the section entitled 'Changing Data Projection Systems' in Chapter 5.

Entering Zone or Longitude?

1) Zone

2) Longitude

Answer **1** for Zone. Then, to

Zone:

Answer

17

A summary of the projection parameters will be displayed and then another menu. If you have made a mistake entering projection parameters, you would choose '2) Redefine projection parameters.' Otherwise, enter:

1

to project your file from geographic to UTM. A message concerning the method of flagging holes will be issued and, when the processing is finished,

More Utilities? Y

will be displayed. Select Y to return to the ENTER/CHANGE menu. Then press <ESC> to return to the QMUtil Main menu. Now the TCPs are in the UTM projection in a MOSS export file named TCP.UTM and are ready to import into the previously created new mapfile.

Import the coordinate data into the mapfile

program
MOSS2QM

On the Main QMUtil menu, select the IMPORT/EXPORT option, and then on the next menu, select the first option ('IMPORT MOSS Data into a QuickMAP Mapfile') to run MOSS2QM.

The computer displays the following:

******* MOSS2QM Import Utility for Data in a MOSS Export Format *******

Import Arcs into Mapfile: C:\QMAP

Edit the default path/directory to include the EXAMPLES subdirectory and enter:

MyMap

(or whatever name you gave the new mapfile created in Step 1, page 5.)

Next, the computer displays:

Current directory is: C:\QMAP\EXAMPLES
Send output to (F)ile, (P)rinter, or (S)creen? F

A summary of the data being imported will be sent to the screen, a disk file, or directly to the printer, depending on your selection. The file produced is helpful for assembling the imported arcs into mapIDs. So, if you were planning to use this mapfile beyond its use in this exercise, it would be a good idea to select F by pressing <Enter> or P if your printer is on line and ready to produce a hard copy of the information. If you choose F, the program will display:

Send Output to C:\QMAP\EXAMPLES\MYMAP.m2q

Accept this default by pressing <Enter>. The next prompt will be:

Import Coordinates from MOSS export file: C:\QMAP\EXAMPLES\MYMAP

Skip to the end of the default path, delete MYMAP, and enter:

TCP.UTM

(Name of output file from the Project utility containing the TCPs in the UTM projection.) The computer next displays:

Select Import Option:

1 = Import all Map Names

2 = Import one Map Name specified from keyboard

3 = Import Map Names specified in a file

Choose option 1 to import all four coordinates in the TCP file. (For other applications, you may wish to import only part of a data file, and will use one of the other options.) The next message will be:

Processing items . . .

1

Then:

Select option used to mark holes in polygons:

1. Negative X coordinate values

2. Non-zero value in trailing field

See the section on 'MOSS Export Format' in chapter 5 of this manual for an explanation of hole marking methods. For now, select the default, option 1, by pressing < Enter>. After working briefly, the computer displays:

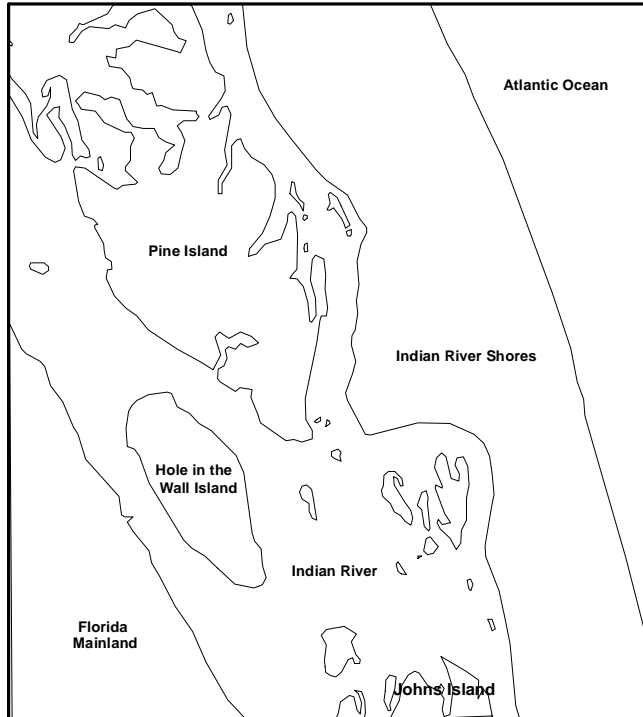
Imported 1 Arcs

(Reminder -- output in file C:\QMAP\EXAMPLES\MYMAP.m2q)

Finished

The newly created QuickMAP mapfile now includes an arc entitled "TCP1" containing the four Target Control Points you just imported. When asked if you want *More Utilities?* select Y and you will be returned to the IMPORT/EXPORT Menu.

Add Data in a MOSS Export Format to the Mapfile



Now that we have created a mapfile and imported geographic reference points, we can continue to build the mapfile in a number of ways. We will be digitizing data directly into the mapfile. But first, let's import some data available from another source. For this example, a file named SmplData.MOS was included with the QuickMAP mapfiles. It is in MOSS Export format and represents the data illustrated at left.

If you are continuing from the previous section, you should be at the QMUtil IMPORT/EXPORT menu. Select the first option, 'IMPORT MOSS Data into a QuickMAP Mapfile.' Because we have already demonstrated the use of MOSS2QM, the instructions in this section will be less detailed.

At the prompt

Import Arcs into Mapfile: C:\QMAP

Edit the path as necessary and enter

MYMAP

You may choose to send the output to a *[F]ile*, *[P]rinter*, or the *[S]creen*, and to the prompt

Import Coordinates from MOSS export file: C:\QMAP\EXAMPLES\MYMAP

edit the default path to

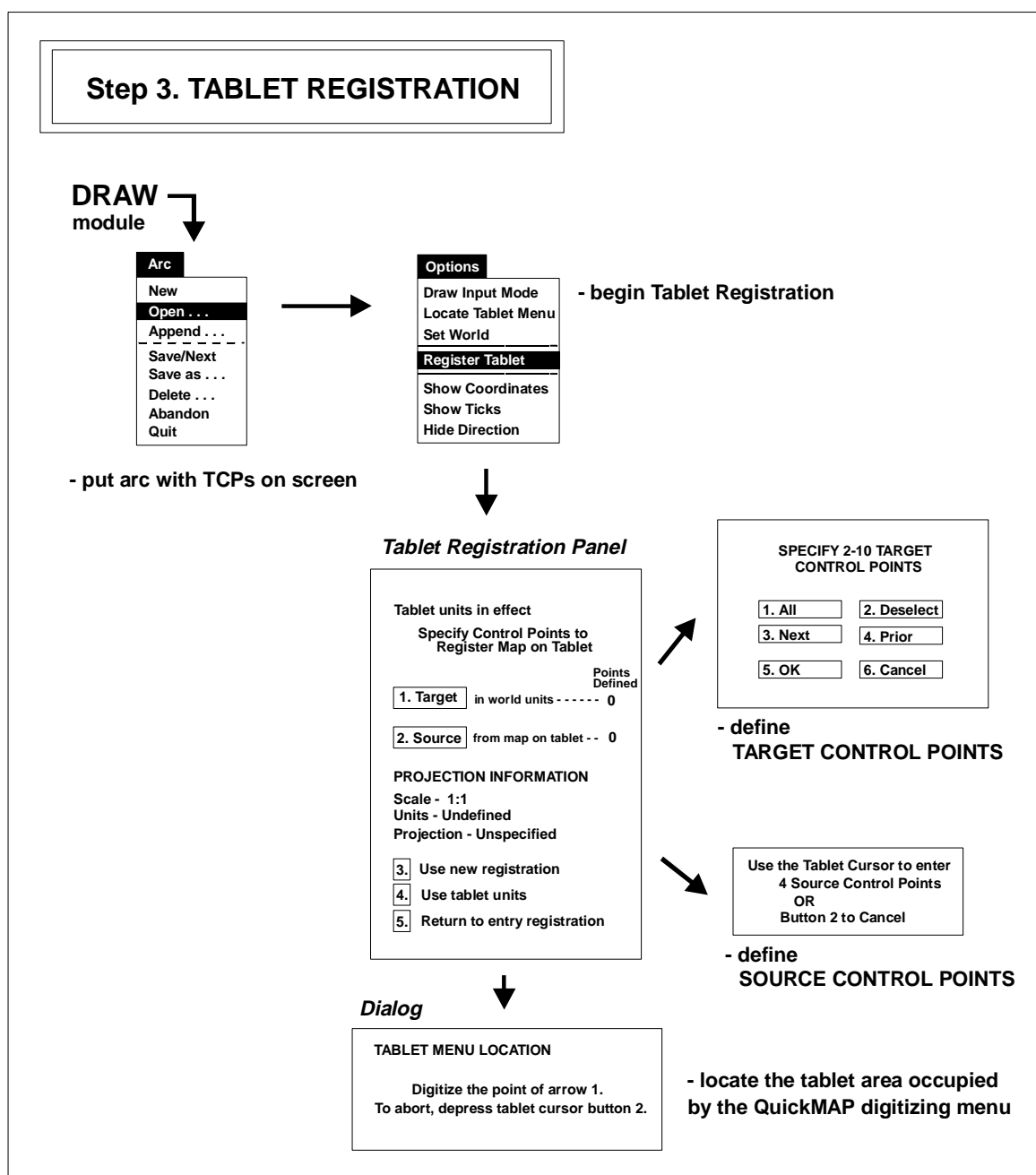
C:\QMAP\EXAMPLES\SmplData.MOS

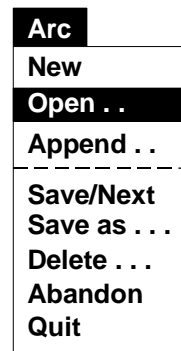
and select Import Option **1 =Import all Map Names** from the menu. As the data is processed, answer **1. Negative X coordinate values** for the option used to mark holes in polygons. If all goes well, there should soon be a message stating that 41 arcs have been imported. When asked if you want **More Utilities?** answer N to be returned to the DOS prompt.

Now the new mapfile contains TCPs and some data digitized by someone else. We are ready to proceed with the Tablet Registration in preparation for digitizing new arcs into the mapfile. Before moving on, you should tape the paper QuickMAP Digitizing Menu and the sample map to your tablet. Both are located at the back of the manual.

Step 3. Tablet Registration in QuickMAP

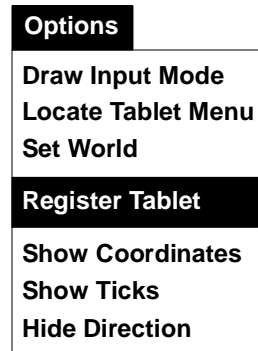
The flow chart below illustrates the overall process for a Tablet Registration. Start QuickMAP in the usual manner, ie., type QM at the DOS prompt. To begin the tablet registration process from the Quickmap GALLERY, 'Open' your new sample map (MYMAP) and then click on DRAW in the GALLERY menu.





Put arc with TCPs on screen

An arc containing the Target Control Points must be on the screen to start the tablet registration. Click on 'Open' in the 'Arc' Menu. When the OPEN ARC dialog appears, type in the name of the arc containing the Target Control Points (TCPs) for the map you wish to register and click on 'OK' or press < Enter>. For our QuickMAP sample map, enter TCP1 (the arc imported in step 2). You may need to adjust the display so the arc is easily visible on the screen. If so, click on 'Arc View' in the 'View' menu.



Begin Tablet Registration

Click on 'Register Tablet' in the OPTIONS menu and a dialog appears on the screen.

Your TCP arc has already been opened, so click on '1. Continue' to proceed with the Tablet Registration.

**Tablet Registration requires that
(2 - 10) Target Control Points be
on the screen.**

1. Continue

2. Cancel

Define Target Control Points (TCPs)

The registration panel appears on the left half of the screen. Click on button '1. Target'.

A new set of buttons for selecting TCPs will be displayed on the bottom half of the registration panel. Follow the instructions to specify TCPs either by clicking on the actual points on the displayed arc or by using the button selections. For example, our TCP1 arc contains only 4 data points, so you may click on the '1. All' button. Arc coordinate points 1 through 4 are labelled on the screen. Then click on button '5. OK' to specify the 4 TCPs. The registration panel will show the number of TCPs you have selected under 'Points Defined.'

Tablet units in effect.

Specify Control Points to
Register Map on Tablet

Points
Defined

1. Target in world units - - - - - 0

2. Source from map on tablet - - 0

PROJECTION INFORMATION

Scale - 1:1

Units - Undefined

Projection - Unspecified

3. Use new registration

4. Use tablet units

5. Return to entry registration

Define Source Control Points (SCPs)

Click on button '2. Source' on the registration panel. Following the messages that appear on the panel, digitize the SCPs on the tablet map, using the tablet cursor. QuickMAP will form a relationship between the TCPs in the mapfile and the SCPs on the sample map so any points digitized on the tablet will correspond properly to mapfile locations. The tablet will beep each time an SCP is accepted. The SCPs must be digitized in the same order that they appear in the TCP arc. For the sample map, digitize all four corners, starting at the lower right-hand corner and moving in a clockwise direction. When you are finished digitizing SCPs, press button 2 on the tablet cursor.

**Use the Tablet Cursor to enter
4 Source Control Points
OR
Button 2 to Cancel**

* Note! If no beeps come from the tablet when you digitize on SCPs, it may need to be re-initialized or it may not be properly installed. See your tablet user's manual for information on initialization. In the QuickMAP User's Manual, see 'QuickMAP Installation with QMSetup' and 'Check Tablet Utility' in Chapter 1 for more help on proper tablet installation.*

If the registration "fit" is unacceptable, a dialog appears. Click on '1. OK'. Then re-start the SCP part of the process by again clicking on '2. Source' on the registration panel.

REGISTRATION UNACCEPTABLE

**The Source Control Points do not
match the Target Control Points
OR
the Control Points were not
entered in the same order**

1. OK

Tablet units in effect		Points Defined
Specify Control Points to Register Map on Tablet		
1. Target	in world units - - - -	4
2. Source	from map on tablet - -	4
REGISTRATION INFO:		
Angular error	=	.121954 degrees
Scaling error	=	Unknown
Registration error	=	62.165 Map Units
3.	Use new registration	
4.	Use tablet units	
5.	Return to entry registration	

If the "fit" is acceptable, the registration panel will change to reflect the number of SCPs and will provide registration information (angular, scaling and registration errors).

The angular error is a measure of the maximum deflection (in degrees) between any pair of target and source control points after rotation. Registration will not be accepted unless this error is less than 5 degrees. Errors less than 0.5 degrees are excellent.

The scaling error represents the percent shrinkage or enlargement of the source data after transformation. This error is relevant

only when the scale of the mapfile and source map are accurately known. If either value is unknown, the scaling error will be reported as 'Unknown'.

Registration error is another estimate of the accuracy of the transformation. The measure represents the distance within which 95% of the control points are established. This is included to assess the USGS's National Map accuracy standards. At a scale of 1:24000, 40 feet is considered "good." The units reported are the same as the units stored in the mapfile when the projection of the mapfile is entered using 'Define Projection' in the GALLERY 'Options' menu. Some or all of the steps in the tablet registration may be repeated if you find the results of the registration unacceptable for your use of the data. You may:

- Select the 'Target' button and re-identify the TCPs. Re-identifying the same TCPs in the same order will not improve the transforms calculated because the point values will be exactly the same. Re-identifying them in a different order will have an effect.
- Select the 'Source' button and re-identify the SCPs. This may improve the transforms calculated if you digitize more precisely. Digitizing the SCPs in a different order will also have an effect.
- Select button '4. Use tablet units'. This returns you to digitizing mode with no transformations in effect. It is the same as if you just entered DRAW and had not yet chosen 'Register Tablet.'
- Select button '5. Return to entry registration' to begin the entire process again.

If you find the registration satisfactory, you may Click on '3. Use new registration', in the registration panel.

Locate the tablet area occupied by the QuickMAP Digitizing Menu

A dialog appears for you to enter the width and height of the paper digitizing menu on the tablet. The default values provided are correct unless you have reproduced the menu and changed its size without changing the corresponding entry in the QM.SYS file. (See 'The QM.SYS File' in Chapter 1 for further information.) Your response ('1. OK' or '2. Cancel') must be entered with a function key (F1 or F2) because the mouse and tablet cursors are temporarily disabled as you switch between them.

If the paper tablet menu size has been altered, enter the correct width and height. A dialog will be displayed asking if you wish to 'Change QM.SYS file to reflect altered DRAW MENU size?' It is a good idea to do so, so press function key F1 to select '1. Yes'.

Following the instructions provided on the next dialog, digitize on the small arrows at lower left,

TABLET MENU LOCATION

**Digitize the point of arrow 1.
To abort, depress tablet cursor Button 2.**

upper right, and lower right corners of the paper Digitizing Menu (in that order); the tablet will beep each time a point is accepted. A dialog will let you know if you need to reposition the menu and re-enter the locating points.

When the location procedure has been successfully completed, control will be transferred to the tablet. The Menu Bar will disappear from the top of the computer screen, indicating that the paper tablet menu must be used to select commands. You may digitize and/or use the tablet cursor on the paper QuickMAP Digitizing Menu. Occasionally, in response to dialog entries, you will be required to type on the computer keyboard. Otherwise, only the tablet need be used. In addition to using keyboard function keys, the buttons on alerts and dialogs may be selected by clicking on the 'Choice' selections on the paper tablet menu with the tablet's cursor. (Click on Choice 1 on the tablet menu to select button 1, Choice 2 for button 2, etc.) You may get back to the mouse pointer and computer menus at any time by selecting 'Draw Input Mode' under 'Options' on the Tablet Menu. Once you have completed a tablet registration, the transforms established will stay in effect until you exit the DRAW module. If you leave DRAW and then return, or if you move your map on the tablet surface, you will have to complete another tablet registration before you begin digitizing again.

It is important to note that many variations on the above example are possible during tablet registration. For example, SCPs may be entered before TCPs, and the entire process may be completed while in Tablet input mode.

Register Mapfile

To continue with the exercises on creating a mapfile, skip to the next section, 'Storing Coordinates with DRAW', beginning on page 3-24. This section on mapfile registration does not follow the logical sequence for creating mapfiles, but is included at this point (following 'Tablet Registration in QuickMAP') because the procedures for tablet registration and mapfile registration are similar.

The 'Register Mapfile' utility is used to adjust the arcs of one mapfile to fit with the arcs of another mapfile, when the projection of one or both of the mapfiles is unknown or unspecified. If you know the projections of both mapfiles and they are the same, the mapfiles can simply be merged, using QuickMAP's 'MergeMap' utility. To merge mapfiles you must be sure that the projections are identical and that all parameters defining that projection are the same for both mapfiles. To check on what parameters have actually been set, use 'Define Projection' in the GALLERY 'Options' menu.

If you know the projections of both mapfiles and they are not the same, you should use the 'Project' utility to re-project one mapfile to match the projection of the other. Then the mapfiles can be merged as described above. See the appropriate sections in chapter 5 for information about using the 'MergeMAP' and 'Project' utilities.

If you use MergeMap to combine two mapfiles when the projections and their defining parameters are not identical, the resulting registration error may be so large that the data will not be useable.

When a mapfile is projected, the coordinates are translated between spherical and planar representation of the earth's surface. This translation is a function of the mathematical properties and parameters of the particular projection from a curved surface to a flat one. If the projection of the data you are working with is unknown, you may transform the coordinate systems directly by way of a rotation and translation. Nevertheless, the resulting accuracy of this transformation is dependent upon the underlying properties of the two projections involved and is best when the two systems are orthogonal to each other and have constant scale in both the x and y axis.

An example of a "map" of unknown projection is the digitizing tablet. In the last section, when we did a tablet registration, the process assumed that the tablet "projection" met the above criteria of orthogonality and constant scale and then proceeded with a transformation of the tablet coordinates that registered to the open mapfile. A mapfile registration is similar. It assumes that the unspecified projection is orthogonal to a target mapfile and has a constant scale. The coordinates are then transformed to register to the target mapfile.

In fact, acceptable registration can occur when the assumption of orthogonality and constant scale are violated. The two noteworthy instances are, first, when the extent of data in the two mapfiles is limited to a small geographic region, and second, when a base map for a large geographic region is used to register small geographic regions individually. The major problem when the above assumptions are violated is that reported error measurements are valid only for control points. These error measurements may appear acceptable even when significant distortion occurs outside

the vicinity of the control points. For instance, consider the unsatisfactory registration of latitude longitude lines to a mapfile in a UTM projection. Results might indicate acceptable error levels for a few control points, but display of a lat/long grid from each reference system would show how poorly the orthogonality assumption was met. In any event, inspection of the results over the extent of a mapfile's information is the best way to detect such problems.

The process of mapfile registration will now be illustrated using some data included with the QuickMAP sample mapfiles. The mapfile to be registered (the 'Source'), is CRANE. The CRANE mapfile contains observation data of Whooping and Sandhill Cranes in seven western states, including New Mexico. The 'Target' mapfile, to which the CRANE data will be registered, is REFUGE. The REFUGE mapfile contains an arc that defines the Bosque del Apache Refuge in New Mexico, one of the nesting areas for the cranes. The projection for the REFUGE mapfile is Universal Transverse Mercator, or UTM; for the CRANE mapfile, the projection is unspecified.

Before you begin a mapfile registration, it is helpful to have the 'Target' mapfile open. Start QuickMAP in the GALLERY and open the mapfile REFUGE by clicking on 'Open' in the 'File' menu and filling in the appropriate information on the dialog that appears. If you included sample mapfiles in your QuickMAP installation, REFUGE will be in the QMAP\EXAMPLES\ directory.

To begin a mapfile registration, select 'Register Mapfile' in the 'Options' menu of the GALLERY. The MAPFILE SELECTION dialog will appear. If you opened the target mapfile as suggested above, its name will already appear on the first line of the dialog. Also, the name of the directory that contains the currently open mapfile will automatically be entered on the two 'Directory:' lines. The text cursor will be positioned at the beginning of the line for Source mapfile. Enter: **CRANE**. You may edit this or any of the other fields, using the QuickMAP editing keys. (See 'Text Cursor' in Chapter 2 of this manual for information on use of the editing keys.) When the dialog is completed properly, click on '1. OK'.

A PROJECTION INFORMATION dialog will inform you of the Target and Source mapfiles' projections (in this case, UTM for the Target and Unspecified for the Source mapfile) and

MAPFILE SELECTIONMapfile containing the Target Control Points : REFUGEDirectory : C:\QMAP\EXAMPLESMapfile containing the Source Control Points : Directory : C:\QMAP\EXAMPLES**PROJECTION INFORMATION**

REFUGE'S Target Projection: Universal Transverse Mercator

CRANE'S Source Projection: Unspecified

Data will be registered to
projection: Universal Transverse Mercator

the projection to which the data will be registered. Click on '1. Continue'.

A registration panel, similar to the one in 'Tablet Registration', will appear on the left side of the screen. To specify TCPs (Target Control Points), click on '1. Target'. Note that REFUGE, the name of the Target mapfile, appears on the Status Line, and the 'CONTROL ARC' dialog is displayed. Enter:

refbnd100

An arc outlining the boundary of the Bosque del Apache Refuge will be drawn on the right side of the screen, and the bottom half of the registration panel will display the buttons used to specify control points. The arc contains 30 points (shown as 'Length' on the Status Line), and only 2 to 10 points may be selected as control points. Use the pointing hand cursor to click on the five refuge boundary corners illustrated at right.

Next click on '5. OK'. Another dialog will appear. If you wish to save the arc containing only the Target Control Points, enter a name and click on 1. Save'. Otherwise, simply click on button

2 to continue. The registration panel will show that 5 TCPs have been defined.

Next, click on '2. Source' in the registration panel, and the name of the Source mapfile will appear on the Status Line. The process for defining Source Control Points (SCPs) is the same as for TCPs, except the CONTROL ARC in this case is 'REFUGE10'. This is the same refuge boundary as in the Target mapfile, but digitized by someone else into another mapfile. Notice the difference in amount of detail between the two versions of the refuge boundary. When you define the control

Specify Control Points to Register Mapfile		
1. Target	- REFUGE - - -	Points Defined 0
2. Source	- CRANE - - - -	0
3. Register Mapfile		
4. Cancel		

File	Information	Options	GALLERY
Utility: REGISTER MAPFILE	Mapfile: REFUGE	Arc: REFBND100	Length: 30

Specify Control Points to Register Mapfile		
1. Target	- REFUGE - - -	Points Defined 0
2. Source	- CRANE - - - -	0

SPECIFY 2-10 TARGET CONTROL POINTS

1. All	2. Deselect
3. Next	4. Prior
5. OK	6. Cancel

```

graph TD
    1 --- 2
    2 --- 3
    3 --- 4
    4 --- 5
    5 --- 1
  
```

points, be sure to click on the same five corners in the same order that you used when defining the TCPs. When the process is complete and the registration panel shows that 5 SCPs have been defined, examine the registration information and decide if the error levels are acceptable. This example is not a very accurate registration, but click on '3. Register mapfile'.

File	Information	Options	GALLERY
Utility: REGISTER MAPFILE	Mapfile: CRANE	Arc: REFUGE10	Length: 6
<p>Specify Control Points to Register Mapfile</p> <p>1. Target - REFUGE --- 5</p> <p>2. Source - CRANE ---- 5</p> <p>REGISTRATION INFORMATION</p> <p>Angular error = 4.733 degrees</p> <p>Scaling error = Unknown</p> <p>Registration error = 375.547 Meters</p> <p>3. Register mapfile</p> <p>4. Cancel</p>			

A dialog will appear for you to enter a name for the new mapfile being created to contain the registered data from the Source mapfile. Type in an appropriate name, such as CRANEUTM (for CRANE mapfile in UTM projection). The directory where

the new mapfile will be saved is the directory that contains the mapfile that was open when you began the registration process, unless you change it using the editing keys. Finally, click on '1. OK'.

An alert will appear and the mouse cursor will be represented as an hourglass while the registration is being completed and the new mapfile saved. When the process is finished, the mouse arrow will reappear. There will be a new mapfile containing

the data from the CRANE mapfile, but in the UTM projection. To be sure that QuickMAP has the correct information stored with the mapfile, you may 'Open' CRANEUTM and then use 'Define Projection' (GALLERY Options menu) to set the parameters for the UTM projection.

Another instance when 'Register Mapfile' may be desirable is when digitizing a lot of complex data from a map that fits on a tablet. If the map is left on the tablet, the initial digitizing and editing can be done in tablet coordinates. This eliminates the step of registering the tablet to a mapfile each time a DRAW session is initiated. When finished, the entire mapfile can be registered, and its arcs imported into the target mapfile. This procedure minimizes the risk that data from

REGISTERED MAPFILE

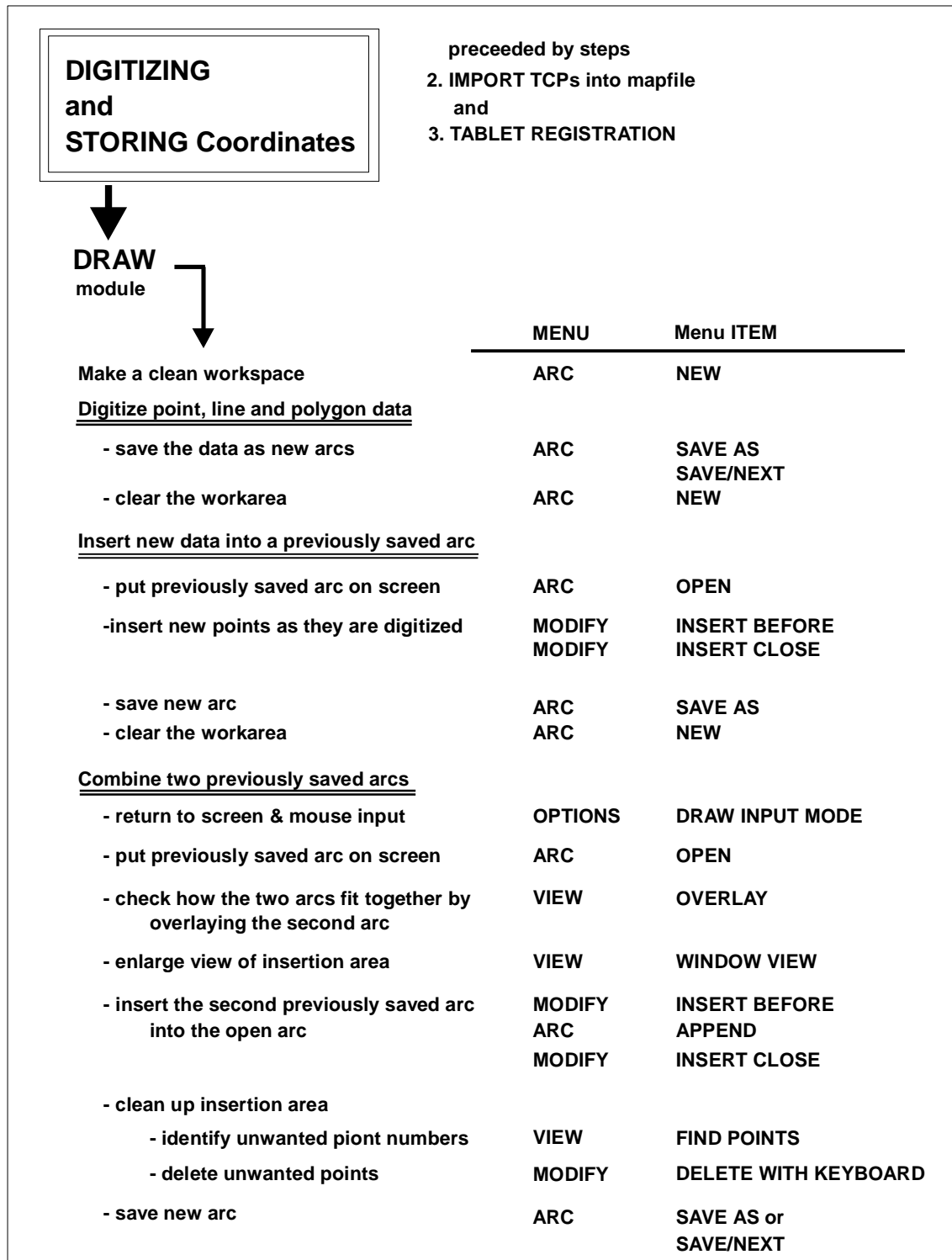
Enter a name for the new mapfile which will contain the registered source data.

Name: CRANEUTM

Directory: C:\QMAP\EXAMPLES

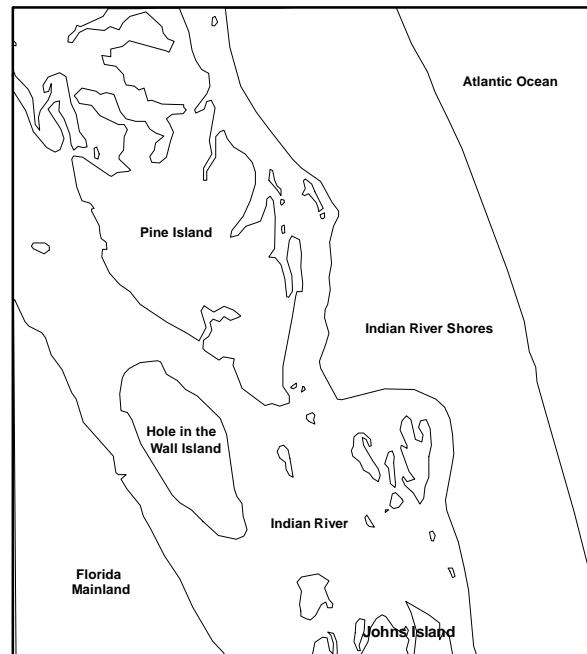
individual DRAW sessions were not all registered the same way. Just remember not to move the map on the tablet, or you will need to go through the tablet registration process anyway.

Storing Coordinates with DRAW



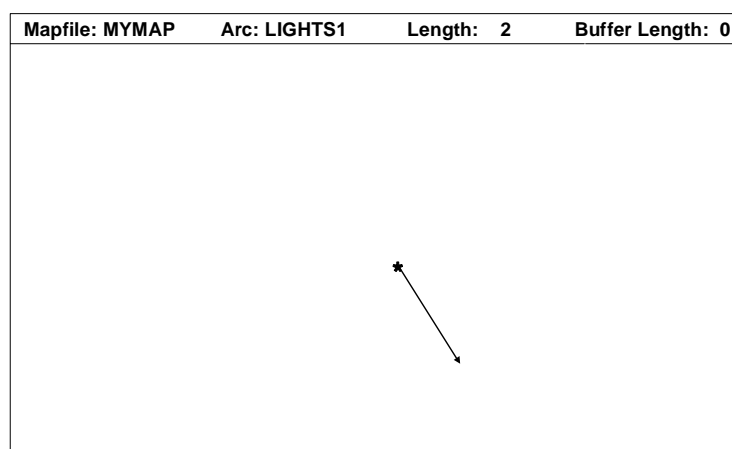
If you are continuing from the section on tablet registration, you are in tablet input mode and can begin digitizing arcs into the mapfile. If you have left the DRAW module or quit QuickMAP between exercises, you will have to complete another tablet registration before proceeding. When the tablet registration is complete, clear the TCP arc from the screen by clicking on 'New' in the 'Arc' column of the paper tablet menu.

Recall that we imported data previously which comprises much of the sample map's contents, and is pictured at right. You have been given instructions to complete the mapfile by digitizing the following: the intracoastal waterway channel, running to the left of Barker Island and marked by dashed lines on the sample map; the two lights marking the channel; Barker Island and the missing part of Johns Island. Compare the sample map on your tablet with the illustration at right to locate these features. Also, Hole in the Wall Island was inadvertently digitized into two separate arcs, and these must be combined into one.



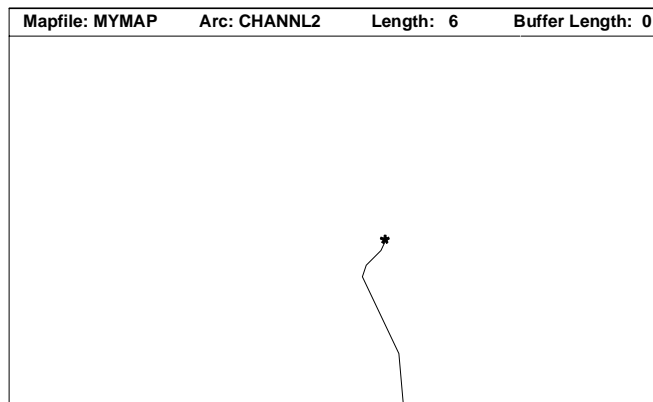
Digitize point and line data

First digitize the channel lights as point data. You could put each channel light in a separate arc, but since we do not have distinguishing information about the individual light sources, just digitize the two points and save them together in a single arc. To save the arc in your mapfile, select 'Save as' from the 'Arc' column on the paper tablet menu. When the dialog appears on the computer screen, type in LIGHTS1 as the arc name. Notice that the default exit button on this dialog is '2. Cancel.' So if you simply press <Enter>, the default will be selected and the arc will not be saved. You must click on '1.OK' (or digitize in the 'Choice 1' box on the paper tablet menu) or press function key F1 to save the arc. The two points just digitized are displayed connected to form a line.



When the data are assembled into a mapID in the ASSEMBLY module, they can be declared POINTS, and will appear as individual points again. Since we have digitized all the lights and wish to change to a new arc family name, select 'New' from the 'Arc' menu. The screen is cleared and the status line reset in preparation for the next arc: arc 'Length' and 'Buffer length' are reset to zero and arc name is changed to UNTITLED.

Next digitize the waterway channel as line data. Digitize the left-hand dashed line first, using enough points to define the bends in the line. To save this arc, select 'Save/Next' from the 'Arc' menu, enter the name CHANNL1, and select '1. OK' (the 'Choice 1' box on the paper tablet menu



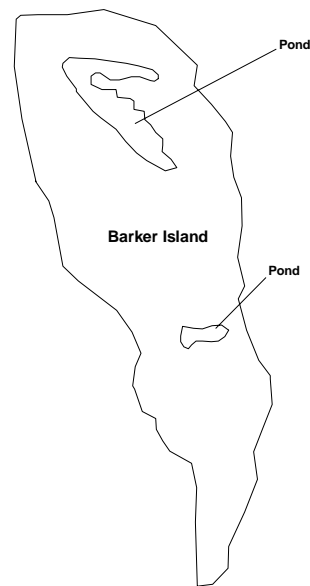
or function key F1). Using 'Save/Next' instead of 'Save as' saves the new arc and prepares for another arc with the same family name. In this case, CHANNL1 is saved, the work area is cleared, and the status line is reset to show zero buffer and arc length and arc name CHANNL2. (CHANNL2 is the next available arc in the CHANNL family.) Digitize the right-hand side of the waterway channel and save CHANNL2 by pressing button number 2 on your digitizing cursor.

When in digitizing mode, pushing button 2 on the cursor is the same as selecting 'Save/Next' from the 'Arc' menu. This is especially convenient when digitizing large numbers of arcs with the same family name, because you can save one arc and start another without moving the cursor from its position on the tablet. Now that CHANNL2 is saved, however, we do not have any more arcs to put in the CHANNL family, so you can start fresh by selecting 'New' ('Arc' menu).

Digitize polygon (outline and hole) data

Now we must digitize the polygon data comprising Barker Island and part of Johns Island. Pick a suitable point to begin and digitize the outline of Barker Island, proceeding in a clockwise direction. It is not necessary to close the polygon by digitizing the last point in exactly the same spot as the first point. When arcs are assembled into MapIDs in QuickMAP's ASSEMBLY module, polygons are automatically closed. Save the outline arc as ISL1 and clear the workarea with 'New.'

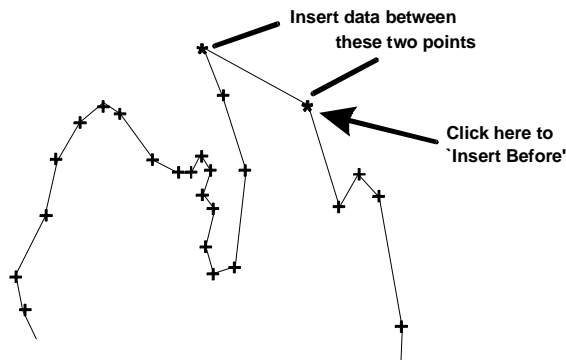
Notice that Barker Island contains two ponds. They may be digitized in the same manner as the island, except that you should proceed in a counterclockwise direction. These two



outlines lying within the outline of the island are thought of as holes and holes should be digitized in a counterclockwise direction. This makes it easier to calculate polygon areas, since the holes (being in the opposite direction) are subtracted out to give the area of the surrounding polygon only. Digitize the two pond outlines and save the arcs under suitable names. Do a 'Save as' after digitizing each arc, or use 'Save/Next' as discussed previously. Again, select 'New' to start fresh.

Insert new data into a previously stored arc

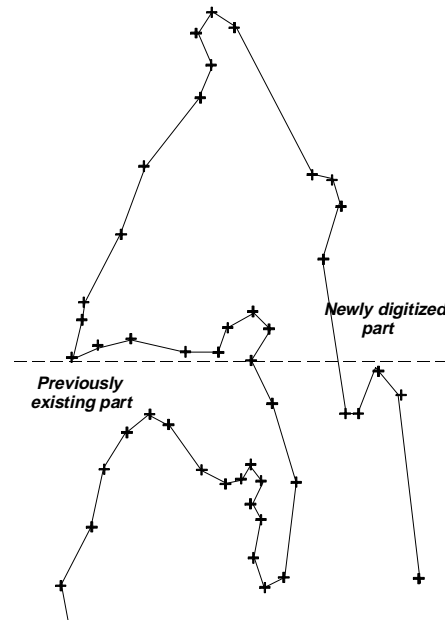
Completing the Johns Island outline requires that a newly digitized area be added to an arc already in the mapfile. It will be easier to begin this editing task on the computer screen than on the tablet, so click on 'Draw Input Mode' ('Options' column on the paper tablet menu) to return to the mouse and screen. 'Open' the arc VERO34 and select 'Show Ticks' from the 'Options' menu to visualize



the individual digitized points of this arc. Enlarge the area of interest by selecting 'Arc View.' Now select 'Insert Before' ('Modify' menu) and the status line will display a message to 'Identify point to Insert Before.' The new data should be inserted between the two points indicated in the illustration at left, so click on or near the right-hand point. This will open the arc for insertion. The selected data point, along with all succeeding points in the arc, will be placed in the buffer for safe keeping. The Status Line shows 'Buffer Length: 5' and arc 'Length' is decreased to 20 to reflect this.

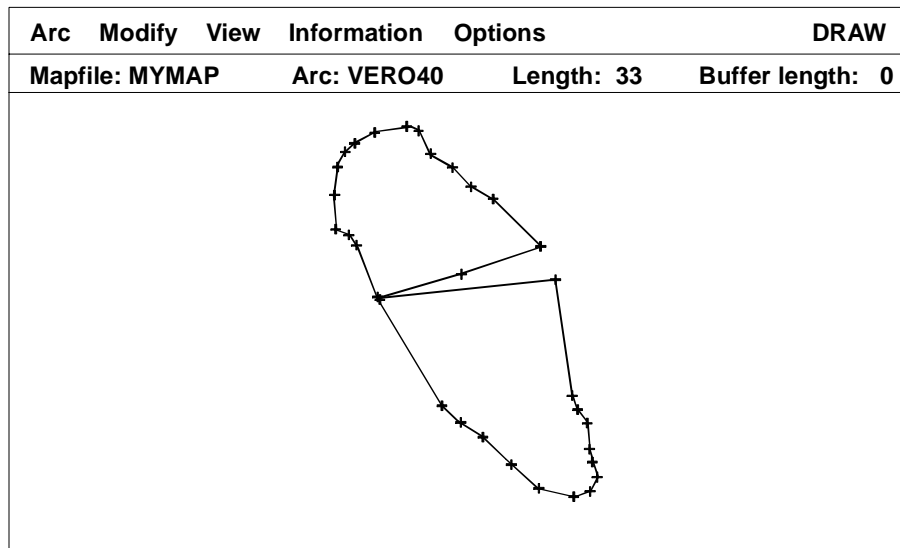
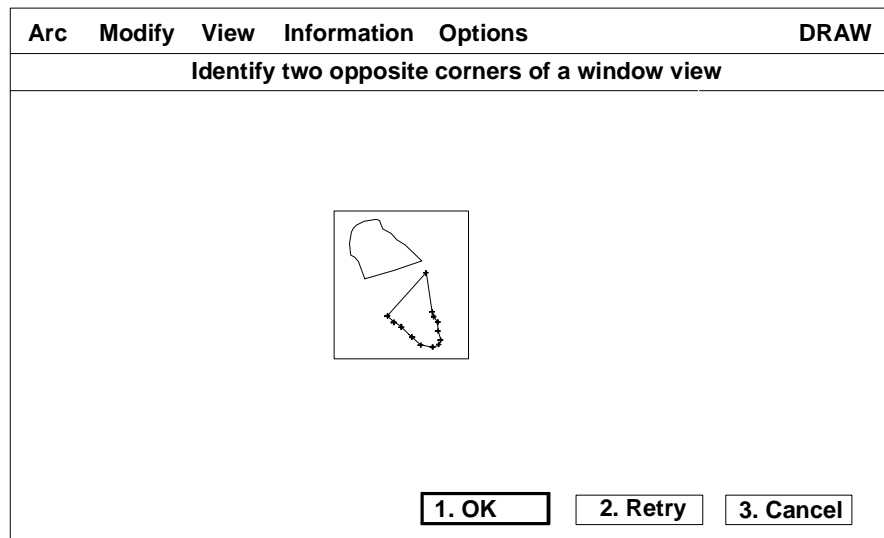
Return to the tablet ('Draw Input Mode') and dig-

itize points defining the missing part of Johns Island. Begin at the left-hand point illustrated above and proceed in a clockwise direction. When you reach the location where the newly digitized part should rejoin the old part of the outline, select 'Insert Close' ('Modify' menu) to complete the insertion. Select 'Arc View' to display the entire arc on the computer screen. The result should look similar to the illustration at right. Save the edited arc under the same name by using 'Save as', leaving VERO34 as the name, and selecting '1.OK' with function key F1. Clear the workarea using 'New' ('Arc' menu).



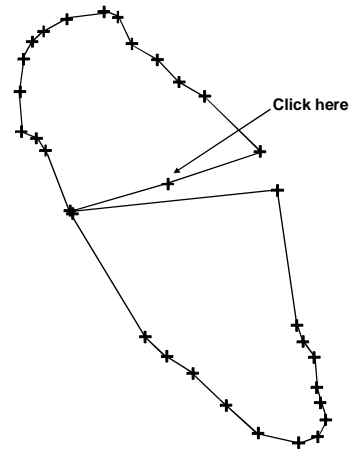
Combine two previously saved arcs

Finally, the two parts of Hole in the Wall Island must be combined into a single arc. It will be easier to edit the arcs on the computer screen, so begin by selecting 'Draw Input Mode' from the 'Options' column of the paper tablet menu. This will return you to the computer screen and mouse mode. Next, 'Open' VERO40 and get a 'World View.' When the arc has been drawn on the screen, select 'Overlay' from the 'View' menu, enter VERO39 on the dialog and select button '1. Arc'. This will display together the two arcs that will be combined. To get a better view for editing, use 'Window View' and define a window, as illustrated at left, that will expand the two arcs to fill most of the workarea. Notice that when the display is re-drawn for the 'Window View', VERO39 (outlined in red) disappears. Any data that is overlaid will be lost when the view is changed, and only arcs that have been 'Open'ed will be re-drawn.



Select 'Insert Before' ('Modify' menu) and, in response to the status line message, select the upper right-hand point on arc VERO40. The status line should show arc 'Length: 4' and 'Buffer length: 11.' Now 'Append' ('Arc' menu) arc VERO39 and close the insertion with 'Insert Close.' The result should be similar to that illustrated at left.

To clean up the insertion, the extra lines across the middle of the island should be removed. You could use 'Delete with Cursor' ('Modify' menu) and simply click on the extra points. However, there are two points from the two arcs in close proximity at the left side where the arcs join and we only wish to eliminate one of them. It may be difficult to click on the one point of the pair that we want. To make sure which point numbers should be removed, select 'Find Points' from the 'View' menu. First click on the point in the middle of the top extra line. It will be marked by a magenta asterisk (*) and the status line displays 'Point 21 marked'. Now click on button '2. Next' at the bottom of the screen to confirm the location of Point 22. Point 22 will be marked by a magenta asterisk. Finally, select '4. Cancel' to close the 'Find Points' dialog.



DELETE WITH THE KEYBOARD

Enter the point numbers of the points to be deleted:

(Sample: 7,13-20,99,121,65,88)

1. Last
2. More
3. Done
4. Cancel

To eliminate points 21 and 22, select 'Delete with Keyboard' ('Modify' menu) and enter 21-22. Click on '3. Done' to clear the dialog. Points 21 and 22 will be marked by red boxes. Click on '1. OK' to confirm the deletion.

When the display is redrawn, the result should be similar to that illustrated below. Be sure to save your work when the editing is complete.

Although these examples are rather trivial, they have introduced you to most of the menu items used to digitize and edit arcs. You may continue to practice digitizing arcs into the mapfile if you wish. When you are finished, exit QuickMAP by selecting 'Quit' from the 'Arc' menu or return to the GALLERY ('DRAW' menu) to continue with the exercises.

Arc	Modify	View	Information	Options	DRAW
Mapfile: MYMAP			Arc: VERO40	Length: 31	Buffer length: 0

Map Assembly of Geographic Features

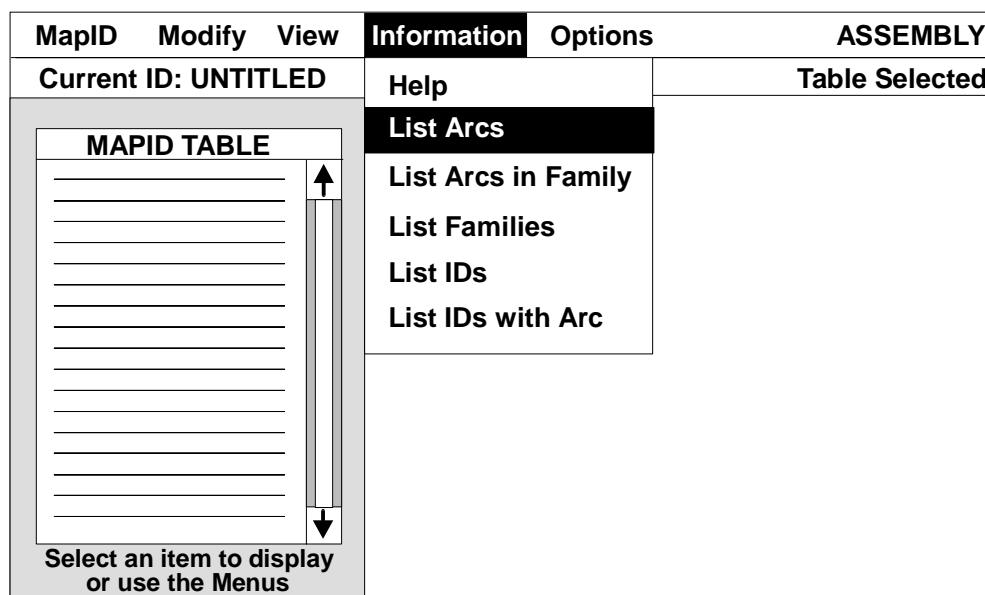
The ASSEMBLY module of QuickMAP offers a variety of options for assembling arcs into mapIDs, and for editing and viewing those mapIDs. MapIDs contain the topology of a single attribute, where topology is the information about how arcs form points, lines, and polygons. Here, we will briefly explore a few of those options by way of examples. Once you are comfortable with the general ways in which you can use ASSEMBLY, you can further explore the menu items and learn to fit ASSEMBLY's capabilities to your own needs.

To begin the exercise, 'Open' the MANATEE mapfile from the QuickMAP GALLERY. (The MANATEE mapfile is in the Examples subdirectory if you installed mapfiles with QuickMAP.) Then click on ASSEMBLY in the GALLERY menu.

Upon entering the ASSEMBLY module, you will see the names of six dropdown menus across the top of the screen: MapID, Modify, View, Information, Options, and ASSEMBLY.

Explore the Data Available in the MANATEE Mapfile

Drop the 'Information' menu by moving the mouse over its name and click on 'List Arcs'.



A dialog will appear listing all arcs in the MANATEE mapfile in alphabetical order. Because the list is too long for a single page, the listing will pause at the end of the first page. You may proceed through the list by clicking on the 'Page Down' button at the bottom of the screen. The combination of 'Page Up' and 'Page Down' allows you to explore the entire list of arcs available in the open mapfile. When you are finished, click on '3. Cancel'.

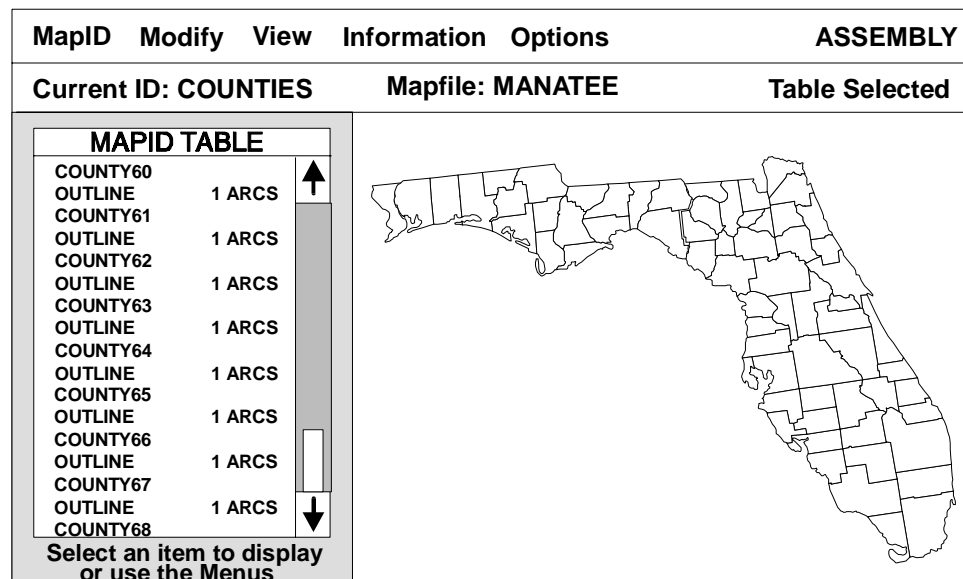
Next, in the 'Information' menu, click on 'List IDs'. A dialog appears that alphabetically lists the names of all mapIDs belonging to the MANATEE mapfile. This listing is short, so 'Page Up' and 'Page Down' do not apply and you will simply get a "beep" from the computer if you click on them. For now, note the mapID named "COUNTIES" and the one named "WINTERDIST". We will use them later. Click on '3. Cancel' to return to the ASSEMBLY display screen.

Open a (Previously Created) MapID



Drop the 'MapID' menu and click on 'Open'. A dialog appears requesting the name of an ID to be opened. Type at the keyboard the name "Counties", using the editing keys to make any needed corrections as discussed in the 'User Interface' sections in Chapter 2. Then press <Enter> or click on '1. OK' and the dialog will disappear. In the Status Line at the top of screen 'Current ID:' will change from 'UNTITLED' to 'COUNTIES'.

The sets of arcs making up the COUNTIES mapID will be listed on the MapID table at the left side of screen. Note that the mapID table scrolls as the arcs are listed, because the list is too long for one page. Each SET on the MapID Table will be identified by a header line showing its topology (outline, hole, lines, or points) and the number of arcs the set contains. This set information will be followed by the names of the individual arcs in that set and, for each arc, whether the digitized direction must be reversed. In this particular case, each set contains only one arc and no arc direction is reversed.



While they are being listed on the ID table, the arcs making up the COUNTIES mapID will be drawn in the work area on the right side of the screen. The final result is illustrated at left.

Adjust the View

In the 'View' menu, click on 'Window View'.

The Status Line will display the message 'Identify opposite corners of a window view'. Note that the mouse cursor has become a cross-hair pointer. Use the cross cursor to define a window by

clicking on two diagonally opposite corners that form a box around the area you wish to have fill the workarea. The window you define depends on what part of the display you would like to see enlarged. Experiment!

When you have clicked on two corners, the box or window they define will be illustrated on the screen and three buttons will appear at the bottom of the display area. If you do not like your window, click on '2. Retry' and you can define a new window. When you are satisfied with the window you have defined, click on '1. OK'. The work area will be cleared and the display redrawn so that the contents of your window are expanded to fill the entire work area.

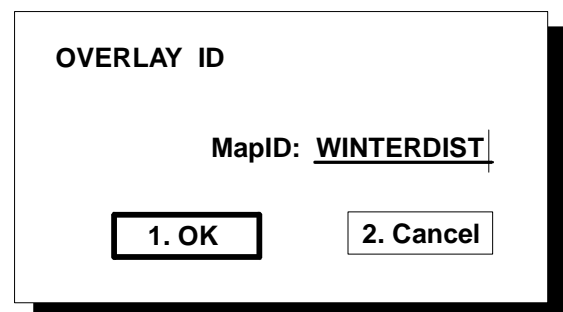
For our current purposes, we wish to go back to the old display scale. To do so, click on 'World View' in the 'View' menu. The work area will be cleared and the display redrawn so that the viewing area or window is defined as the minimum bounding rectangle that can enclose all the arcs in the currently open mapfile. In this case, the "world" for the MANATEE mapfile is the state of Florida.

As a comparison, drop the 'View' menu and click on 'Table View'. Notice any difference in the display? This should clear the work area and re-draw so that the window is defined as the minimum bounding rectangle that will contain all the arcs currently in the mapID table. (This includes all arcs in the currently open ID, not just those showing on one page of the table.) In this particular example, the size of the "world" and "table" are the same, since the mapID table lists all the counties of Florida and the world (or mapfile) boundary also is Florida.

Overlay a mapID

Before using the 'Overlay' command, select some display options that will make the overlay easier to see. In the 'Options' menu, click on 'Color'. On the dialog that appears, click on the bright blue color bar. Again drop the 'Options' menu and click on 'Point Symbol'. (The overlay we will use contains point data.) On the dialog, click on the * symbol to change from the default X symbol.

Now, overlay the ID. In the 'View' menu, click on 'Overlay ID'. A dialog will appear, requesting the name of an ID to be overlayed. Type in the name "Winterdist"; this particular ID contains point data on the winter distribution of manatees along a certain part of the Florida coast. Press <Enter> or Click on '1. OK'.



OVERLAY ID

MapID: WINTERDIST

1. OK **2. Cancel**

The data (arcs) in the mapID 'Winterdist' will be overlaid or superimposed on the current display of Florida COUNTIES.

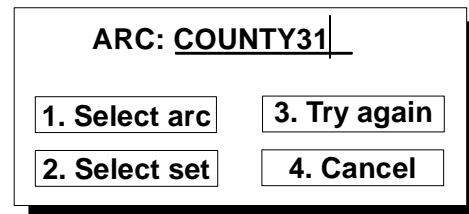
Identify Specific Arcs in the Open MapID

Suppose you wish to assemble a new mapID that will emphasize only that part of Florida where the overlay shows the winter distribution of manatees to be most concentrated. You can see from the display that the concentration of point data occurs in three counties along the southeast coastline. But there are 68 arc numbers, representing 68 counties, on the Florida outline map. Which 3 do you need? You can identify the three arc numbers needed using 'Pick arc'.

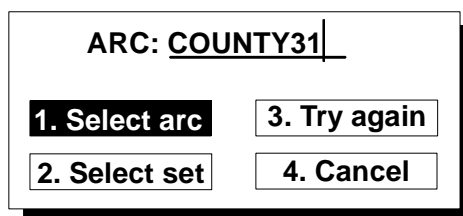
In the 'Options' menu, click on 'Pick arc/set'. The Status Line will display the message 'Identify arc desired'. Move the mouse cursor in the work area and click within the topmost county where the concentration of point data occurs. A dialog will appear with an arc name already entered, and the arc corresponding to that name will be outlined in red on the display.

If you happen to click near an area where multiple arcs coincide or converge, QuickMAP may not automatically select the arc you intended. So, if the county outlined in red is not the one you wanted, select the button 'Try again' and QuickMAP will continue its search, entering another arc name on the dialog and outlining the corresponding arc in red on the display. This process can continue until

QuickMAP has exhausted all arcs located near where you clicked. Usually, though, you will be able to click in an area that clearly indicates your choice, and QuickMAP will pick the correct arc immediately. Notice also that there is a vertical cursor on the line following the arc name entered by QuickMAP. This indicates that you may edit the name or erase it and enter a new name yourself instead of using the 'Try again' button.



Once the correct arc (COUNTY31) has been entered on the dialog and outlined on the display, you may click on the 'Select arc' or 'Select set' button if you wish to have the chosen arc or set

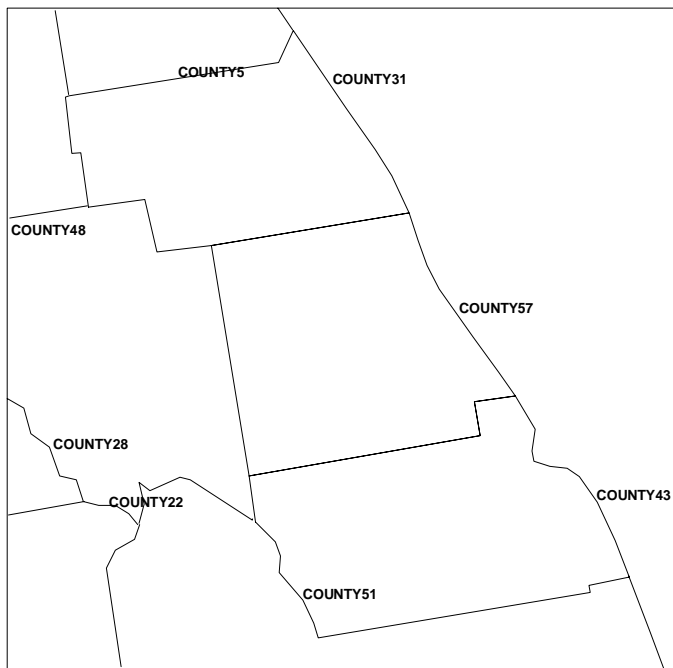


automatically selected in the ID Table. This feature is convenient when you are identifying arcs or sets to be modified and they must be selected in the Table before a 'Modify' command will work. (An example of such a command is 'Remove Arc'.) For demonstration purposes, click on '1. Select Arc'.

When you click on 'Select Arc' the dialog will disappear, the Status Line will be reset, and the arc "COUNTY31" will be selected in the mapID table (indicated by an arrowhead to the left of the name). You may need to scroll through the mapID list to confirm that arc COUNTY31 is indeed selected. Repeat the above process to identify the arc names COUNTY57 and COUNTY43 as the other two counties with the greatest concentration of manatee point data. To repeat: click on 'Pick arc/set' in the 'Options' menu; click within the boundary of the desired county on the display; click on 'Select arc' or 'Cancel' to exit the dialog when the correct county arc has been outlined in red in the display.

Before proceeding, de-select whatever arc or set might remain selected. Do this by clicking on its name in the ID Table. The right end of the Status Line will show 'Table selected' when all arc and set selections have been cleared. This is done because, if an arc/set remains selected, the next time you select a command to change the view, only the selected arc/set will be affected. For example, if arc COUNTY31 remained selected and you cleared the display and executed a 'Redraw', then only COUNTY31 would be drawn in the work area.

There is another way to identify individual arcs on the ASSEMBLY display. Select 'Arc Names on' from the 'Options' menu. Then click on 'Redraw' in the 'View' menu and the display will



be redrawn with each individual arc labelled. The view showing all of Florida, however, is too crowded and the names are difficult to distinguish. Using 'Window View' ('View' menu), define a window in which the area around the three counties and winter distribution data will fill the entire work area. This should allow you to see the individual county arc names as illustrated at left. But notice that the overlaid WINTERDIST (point) data disappears when the window view is drawn. Any time the view is changed by the user and the display redrawn, any overlaid arcs or IDs will disappear. Only those arcs/IDs listed on the ID Table will remain. Also, only arcs on the ID Table, and not overlaid arcs, are labelled by 'Arc

Names on'. When you are finished identifying the arc names needed for a new mapID, move on to the next section.

Assemble a New MapID

Before assembling a new mapID, some preparations are needed. First, clear the mapID table by clicking on 'New' in the 'MapID' menu. In the Status Line, notice that 'Current ID:' will change from 'COUNTIES' to 'UNTITLED'. Next, click on 'Clear' in the 'View' menu to clear the work area.

Select black as the display color ('Color' in the 'Options' menu) and a "plus" as the point symbol ('Point Symbol' in the 'Options' menu). This sets the display parameters back to default values and was done just to remind you that, once you have changed display parameters (as you did previously before overlaying a set), the changes you make will stay in effect until you change them again.

Now you are ready to begin assembling the mapID. In the 'Modify' menu, select 'Add Sets'. A dialog like the one illustrated below will appear. Note that there are several possible choices to be made for each set of arcs added to the mapID table. The default values are currently selected, as indicated by reverse video. For 'Set Type', leave 'Outline' selected, because you are going to add outlines of Florida counties. Also leave 'All Arcs' selected; this means that all arcs in the set about to be added will together comprise a single outline. Selecting 'Each Arc' would mean that each individual arc in the set would comprise an outline. Leave 'Normal' direction selected,

ADD SETS IN TABLE Enter arc name or select exit button

Set Type: **OUTLINE** HOLE LINES POINTS

for: **All Arcs** Each Arc

From Arc: _____ To Arc: _____

Direction: **NORMAL** REVERSED

1. More 2. Done 3. Cancel

because the outline arcs to be added were digitized in the correct, clockwise, direction. Had you wished to change any of the selections, you would do so by clicking on an alternate button; this would select the new button and de-select the other.

The text cursor is positioned on the line following 'From Arc'. Type in "County31" and press <Enter>. The vertical cursor will move to the 'To Arc' field and will automatically show "COUNTY31". This will make a set consisting of one county in Florida. Click on '1. MORE', which means "add this set of arcs to the mapID table and stay in the dialog so more sets may be added". The message near the top of the dialog will say 'Processing arcs...'

When the message changes to 'Enter another set...' and the vertical cursor reappears on the 'From Arc' line, repeat the above process to add a set consisting of COUNTY43. Keep the options as they are ('Outline', 'All Arcs', and 'Normal' direction) and click on '2. Done', which means "after you add this set of arcs to the mapID table, I am done so return to the table and display it on the screen." In the work area, arcs COUNTY31 and COUNTY43 (the outline borders) are drawn as they are entered on the table.

Edit a MapID

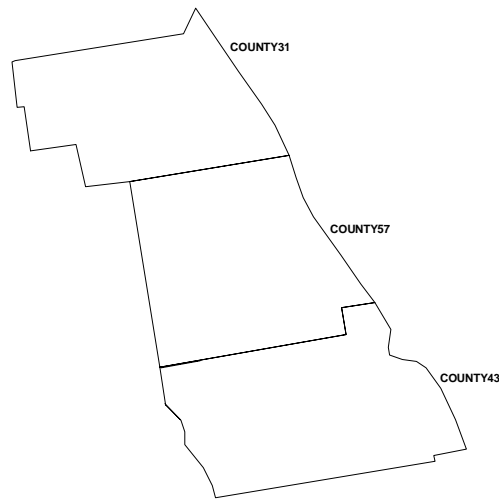
Oops! There seems to be something missing in our mapID - COUNTY57. We can correct that by inserting county 57 into the mapID between counties 31 and 43.

In the mapID table, click on the header line just above "COUNTY43". This selects the set consisting of the COUNTY43 arc, so the data we are going to add can be inserted before this set in the mapID table. If you clicked on the line "COUNTY43", the arc instead of its set would be selected. The added data would then be inserted within the same set (under the set header line), but just ahead of COUNTY43. If you selected the proper line in the table, the Status Line should display 'Set Selected' at the far right.

Now click on 'Insert Before' in the 'Modify' menu. In the mapID table, the header line ("Outline1 Arcs") above COUNTY43 is moved to the bottom of the table. It is shown in gray, indicating that the set (and all following data) is temporarily inactivated and will not be affected by any operations on the mapID until reactivated. The lines between the COUNTY31 and COUNTY43 sets have been cleared for insertion of new data.

Now all you need to do is add arc COUNTY57. So select 'Add Arcs' from the 'Modify' menu and enter COUNTY57 on the dialog that appears. Exit the dialog with button '2. Done'. The three county outlines should now be displayed in the work area.

We could continue to add more sets or individual arcs to the table, inserting them in whatever positions we wished, but for now we will end the editing session. Click on 'Insert Close' in the 'Modify' menu and the list of sets will be closed, the temporarily inactivated part reactivated and moved up to follow the new entry.



Save a MapID

To save your newly assembled mapID, select 'Save as ...' from the 'MapID' menu. At the text cursor, type COUNTIES and press <Enter> or click on '1. OK'.

An Alert appears to warn you that a mapID named COUNTIES already exists and will be replaced by your newly assembled ID if you continue. Since you do not wish to lose the other mapID already named COUNTIES, click on '2. Cancel'.

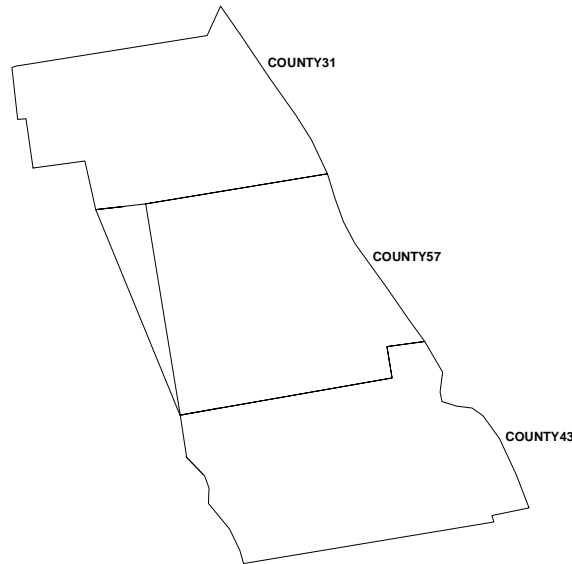
Select 'Save as...' again and the dialog will return. Type in some name other than COUNTIES and press <Enter> or click on '1. OK'. Rules for naming mapIDs are given in 'Some QuickMAP limits' in Chapter 1. If the mapID name you enter is available and acceptable, the Status Line will show it as your 'Current mapID:'

Difference between 'Add Arcs' and 'Add Sets'

Notice that in the 'MapID Table', arcs COUNTY31 and COUNTY57 are included under the same set header line. This is because we used 'Add Arcs' to add COUNTY57. If we had used 'Add Sets', COUNTY57 would be a set by itself. Is there any problem with this? The display looks fine.

Select 'Overlay ID' from the 'View' menu and enter the name of your three county mapID to overlay it on top of itself. The overlay should look similar to the illustration at right.

What is the extraneous line on the left side of the COUNTY31 and COUNTY57 outlines? Because these two arcs are entered in the same set, ASSEMBLY has connected them to form one outline. The extra line is the connection between the end of arc COUNTY31 and the beginning of arc COUNTY57. If 'Add Sets' had been used to insert COUNTY57 into the mapID table, this would not be a problem.



To edit the mapID table, begin by clicking on "COUNTY57" to select the arc name. Then select 'Remove Arc' from the 'Modify' menu and confirm the removal of COUNTY57 on the dialog that appears. Next, follow the procedure outlined previously to insert COUNTY57 into the mapID table but this time, use 'Add Sets' instead of 'Add Arcs'. When you have added an outline set consisting of COUNTY57 and closed the insertion, 'Clear' the display. Turn 'Arc Names off' ('Options' menu) and 'Redraw' ('View' menu). Be sure to 'Save' ('MapID' menu) your work.

Again overlay your three county ID on itself to be sure each county is now an individual outline set.

Overlay Point Data

Finally, overlay the winter distribution data for manatees. We could add it to the MapID Table with the county borders, but it is better not to mix set types in a mapID. The county borders are OUTLINE sets and the manatee distribution data represents a POINT type set. Data representing different set types (outline, line, point) may be combined in the DISPLAY module by adding IDs with various types to a 'Map List'. This process is described in the next section, "How to Compose a Map with DISPLAY."

Select 'Overlay ID' from the 'View' menu, enter WINTERDIST, and the distribution data will be added to the display as black + symbols. Be aware that even if 'Save' or 'Save as' was now

executed, the saved mapID would not include the manatee distribution data. Only the arcs entered on the ID Table, the three county outlines, would be saved. The winter distribution data is simply overlayed on the display and would not be saved as part of the ID.

MapID	Modify	View	Information	Options	ASSEMBLY
Current ID: UNTITLED			Mapfile: MANATEE		Table Selected
<div><div><div>MAPID TABLE</div><div><div>Outline1 Arcs</div><div>COUNTY31</div><div>Outline1 Arcs</div><div>COUNTY57</div><div>Outline1 Arcs</div><div>COUNTY43</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div><div>↑</div><div></div><div>↓</div></div></div><div>Select an item to display or use the Menus</div><div></div></div>					

Save a Copy of the MapID Display

Drop the 'MapID' menu and click on 'Output'. A dialog requests a GEM file name under which to save your mapID display. Rules for naming GEM files are the same as for naming DOS files, except the .GEM extension is automatically supplied. When you have typed in a satisfactory file name, click on '1. OK' or press <Enter>.

The cursor becomes an hourglass while a special file is being saved. This GEM file may later be used by the GEM output utility (accessible through the GALLERY) to produce a hard copy of the mapID display on a printer installed for GEM. Only those arcs listed in the ID Table, not any overlaid arcs/IDs will be included in the output file.

Merge IDs

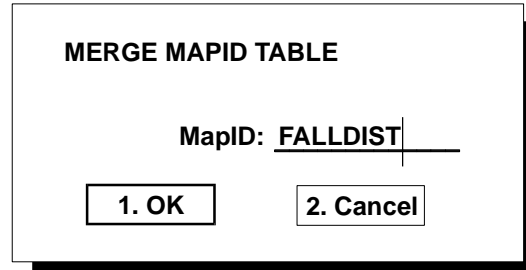
If you already have assembled some mapIDs and decide that you want the information in them combined into one ID, you could start over and enter all the arc sets on a new mapID table. Or, you can save time using the ‘Merge ID’ command in the ‘Modify’ menu.

There are four IDs in the MANATEE mapfile representing manatee distribution during various seasons: WINTERDIST, FALLDIST, SUMMERDIST, and SPRINGDIST. Let's combine the winter and fall IDs into one to show the distribution during the cooler part of the year.

Prepare by clearing the MapID Table ('New', 'MapID menu') and the work area ('Clear', 'View' menu). Then 'Open' ('MapID' menu) the WINTERDIST ID. When the arcs have been listed on the Table and the point data drawn in the work area, you are ready to merge with the fall distribution. First, select a different 'Color' and 'Point Symbol' from the 'Options' menu to distinguish the fall data from the winter points on the display.

Next, select 'Merge ID...' from the 'Modify' menu and enter FALLDIST on the dialog. The set comprising the FALLDIST ID will be added to the MapID Table following those for WIN-TERDIST and the arcs will be drawn in the work area. The work area will not be cleared first, so arcs from both distributions will be displayed together.

To keep this new merged ID, remember to save it under a new name by selecting 'Save as' from the 'MapID' menu.



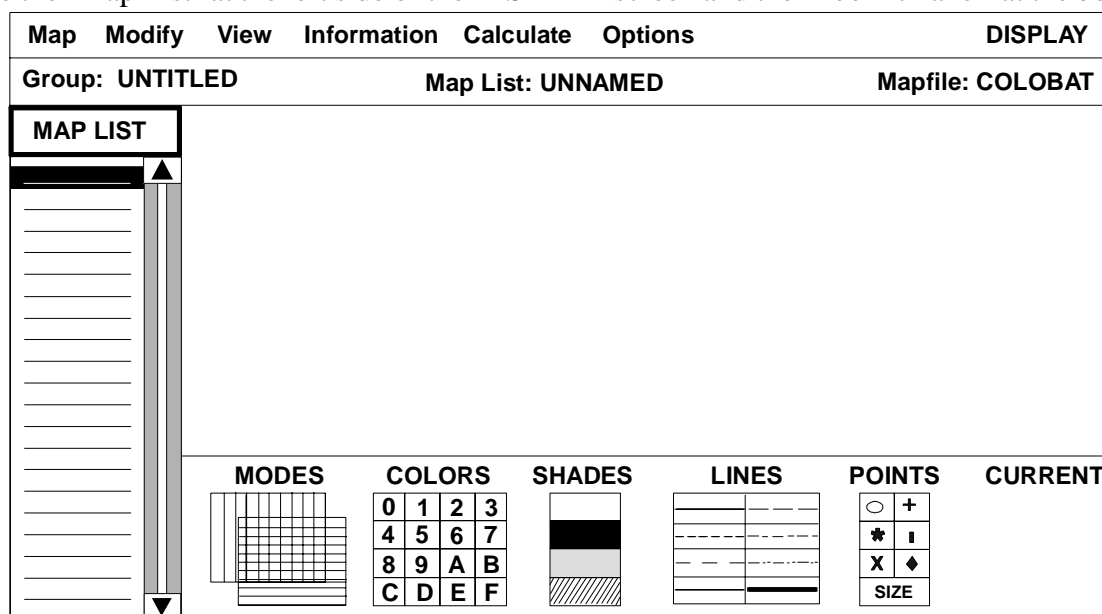
Now that you have been briefly introduced to map assembly, learn more about the numerous options available by exploring the possible selections in the ASSEMBLY menus. Descriptions of these menu items are given in Chapter 4 in the section 'ASSEMBLY Menus'. For more practice, you may wish to assemble the arcs in MYMAP, the mapfile created in the first part of this chapter, into mapIDs. When you are finished, you may leave QuickMAP by selecting 'Quit' from the 'MapID' menu or return to the GALLERY to continue with the exercises.

How to Compose a Map with DISPLAY

To demonstrate use of QuickMAP's DISPLAY module, we will use the COLOBAT mapfile, which was installed on the \QMAP\EXAMPLES directory by QMSetup if you selected to install sample mapfiles with QuickMAP. This mapfile contains data on the distribution of various types of bats in the state of Colorado. A listing of the arc families in the COLOBAT mapfile is given in the Appendix section 'Sample QuickMAP Mapfiles and Description of their Contents.'

In the GALLERY, 'Open' the COLOBAT mapfile. Then enter the DISPLAY module by clicking on 'DISPLAY' in the GALLERY menu.

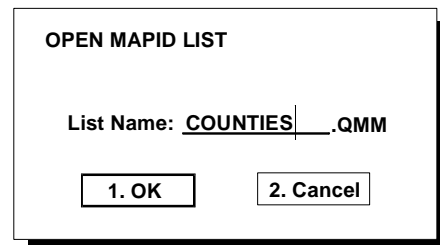
Note the 'Map List' at the left side of the DISPLAY screen and the 'Toolkit Panel' at the bottom.



To compose a display, or "Map", IDs are added to the 'Map List'. Then display attributes, like colors, shading, line types and point symbols are assigned from the Toolkit to the IDs on the list. Also note the names of seven dropdown menus across the top of the DISPLAY screen: Map, Modify, View, Information, Calculate, Options, and DISPLAY.

Open a Map List and Save a View

Drop the 'Map' menu and click on 'Open...'. On the dialog that appears, enter COUNTIES. This is a map list that was previously created, containing outlines of all the counties in Colorado. Notice that each county name is listed as a MapID on the 'Map List'.



Click on 'World View' in the 'View' menu and the MapIDs on the 'Map List' will be drawn in the work area. A reproduction of the Colorado counties map, with county names added, is shown on the next page. Note that it may take a considerable amount of time to draw a fairly complex Map such as this on the screen. For this reason, it is sometimes helpful to create a bit image file of a "View". To do so, select 'Save View' ('View' menu) and enter COUNTIES on the dialog that appears. The "View" will be saved in a file separate from the COUNTIES.QMM 'Map List' file. It will have the extension .BK?, where the ? will be V, E, C or H for the VGA, EGA, CGA or HGC graphics card installed for GEM and QuickMAP.

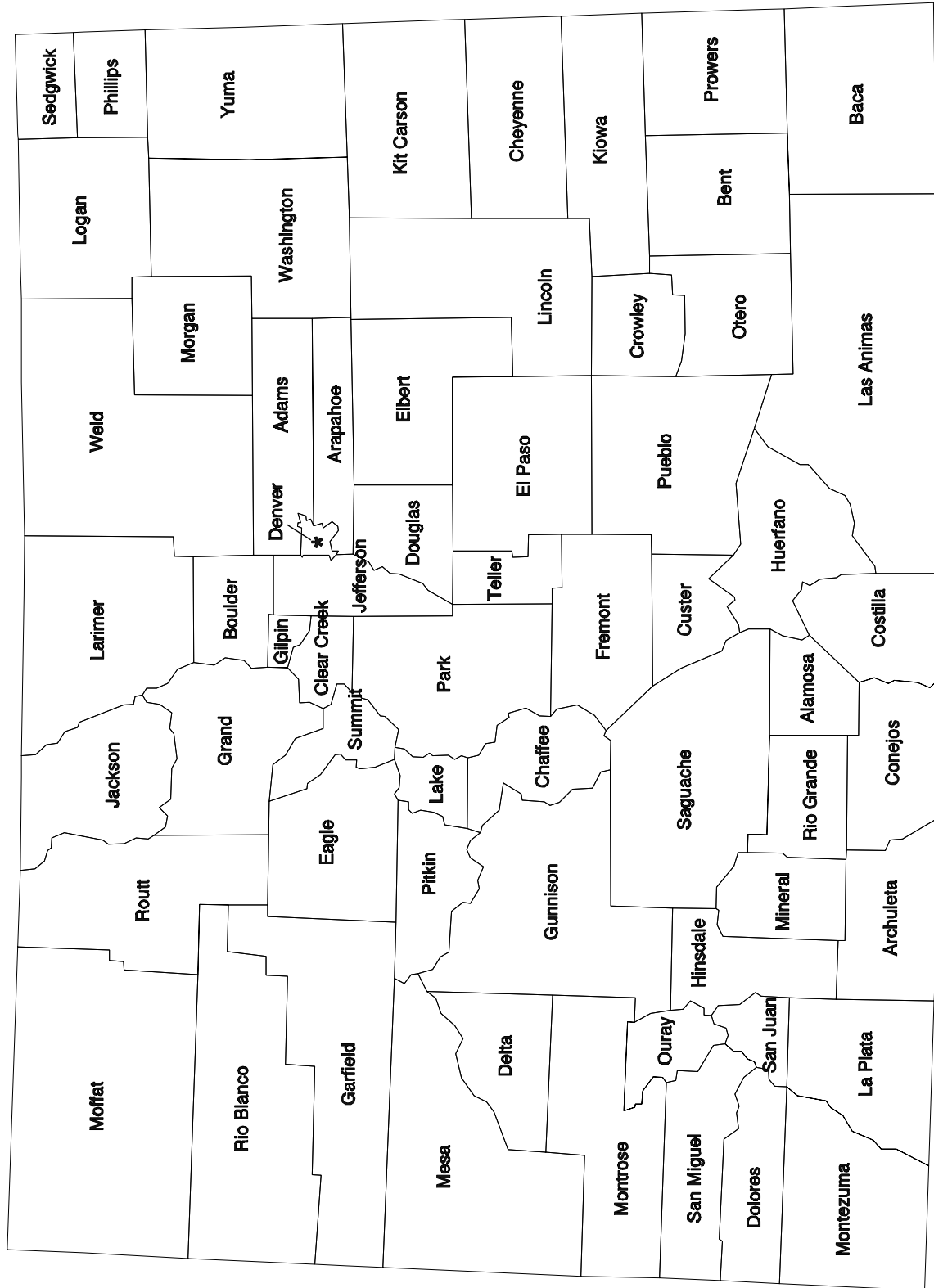
Now demonstrate the use of the "View" just created by first clearing the Map List and screen ('New' in the 'Map' menu). With nothing on the 'Map List', select 'Load View' ('View' menu) and enter the COUNTIES name. The previously saved "View" of Colorado counties will appear almost instantaneously in the work area. Using such a "View" can save time and effort, especially for a background display that will be used repeatedly.

Create a simple Map

To create a "Map", mapIDs must first be added to the 'Map List'. In the COLOBAT mapfile, there are 17 mapIDs that were previously assembled from point data to represent the distributions of 17 types of bats in Colorado. The bat IDs, listed below, can be identified by dropping the 'Information' menu and selecting 'List IDs'. The list on the screen will also include the names of Colorado county IDs.

ID Name	Bat Type
BGFREETAIL	Big Free-Tailed Bat
BIGBROWN	Big Brown Bat
BRFREETAIL	Brazilian Free-Tailed Bat
CALIFORNIA	California Myotis
FRINGEDMYO	Fringed Myotis
HOARYBAT	Hoary Bat
LONGEARMYO	Long-Eared Myotis
LONGLEGGED	Long-Legged Myotis
LTLBROWN	Little Brown Bat
PALLIDBAT	Pallid Bat
REDBAT	Red Bat
SLVRHAIRD	Silver-Haired Bat
SMALFOOTED	Small-Footed Myotis
SPOTTEDBAT	Spotted Bat
TWNSBIGEAR	Townsend's Big-Eared Bat
WESTERNPIP	Western Pipestrelle
YUMAMYOTIS	Yuma Myotis

Colorado Counties



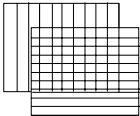
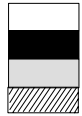
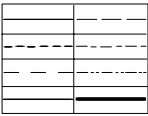
The first Map you will create is the distribution of the Brazilian Free-Tailed Bat by county. To determine the counties where this type of bat has been observed, you need to look at the BRFREETAIL ID. Enter that ID name on the 'Map List' by dropping the 'Modify' menu and clicking on 'Add/Replace ID'. Enter BRFREETAIL and select '1.Done', and the ID name will appear on the 'Map List'.

ENTER SELECTION


MapID: BRFREETAIL

1. Done
2. More
3. Cancel


Next you may select display attributes for the point data in the BRFREETAIL ID. In the Toolkit Panel at the bottom of the screen, select a color by clicking on one of the 'COLORS' boxes.

MODES	COLORS	SHADES	LINES	POINTS	CURRENT																								
	<table border="1" style="font-size: small;"> <tr><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>5</td><td>6</td><td>7</td></tr> <tr><td>8</td><td>9</td><td>A</td><td>B</td></tr> <tr><td>C</td><td>D</td><td>E</td><td>F</td></tr> </table>	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F			<table border="1" style="font-size: small;"> <tr><td>○</td><td>+</td></tr> <tr><td>★</td><td>!</td></tr> <tr><td>X</td><td>◆</td></tr> <tr><td colspan="2">SIZE</td></tr> </table>	○	+	★	!	X	◆	SIZE		
0	1	2	3																										
4	5	6	7																										
8	9	A	B																										
C	D	E	F																										
○	+																												
★	!																												
X	◆																												
SIZE																													


COLOR SELECTION for



Points



Lines



Polygons

1. OK
2. Cancel

On the dialog that appears, turn on the 'Points' button by clicking on it, and toggle off the button for 'Polygons'. Exit the COLOR SELECTION dialog with button '1. OK'. Next, select a point symbol (a +, for example) by clicking on your choice under 'POINTS' in the Toolkit. Notice that your attribute choices are shown for the 'CURRENT' selection at the far right end of the Toolkit Panel.

POINTS

○	+
★	!
X	◆
SIZE	

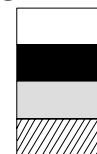
Now drop the 'View' menu and select 'Redraw'. The data points representing the Brazilian Free-Tailed distribution will be drawn over the COUNTIES view already on the screen. You could now save this 'Map List' ('Save as', 'Map' menu) to be recalled later or make a .GEM file ('Output', 'Map' menu) for output to the printer or screen. Be aware that doing so would save only the point data representing bat distribution. The county outlines that are on the screen as a result of a 'Load view' would not be saved because they represent only a bit image and are not part of the 'Map List'.

Instead of saving the current Map as is, we will use it only to determine the county distribution of Brazilian Free-Tailed bats for another map. Compare your display screen to the county names map and note the names of counties in which bat data points appear. Then clear the 'Map List' and the work area by selecting 'New' in the 'Map' menu. An alert will notify you that the contents of the 'Map List' (BRFREETAIL ID) have not been saved. Click on '2. Abandon' since we do not wish to save the current 'Map List'.

Begin to create the new Map by adding ID names to the 'Map List'. You will eventually wish to save a Map showing all Colorado counties, with those containing Brazilian Free-Tailed bat sites distinguished by fill pattern. So you cannot just select 'Load view' to draw a bit image of the counties on the screen. Instead, all 63 Colorado county names must be entered on the 'Map List', using 'Add/Replace ID'. To save time, this task has been completed for you, and the Map saved in the file COUNTIES.QMM. So you may simply 'Open' ('Map' menu) the COUNTIES Map. Also select 'World View' ('View' menu) so you can see the map on the screen.

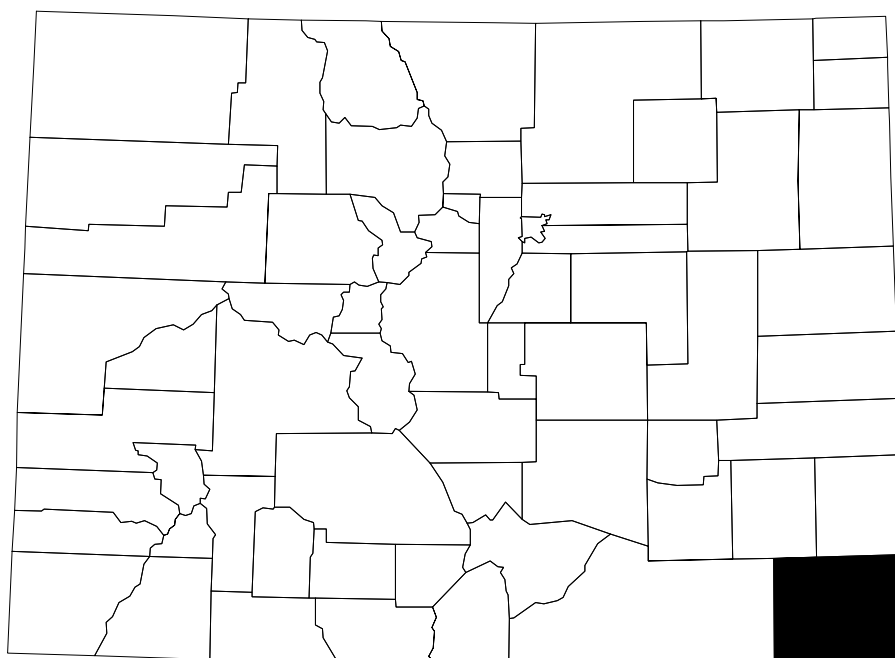
Next, choose display attributes for the counties on the 'Map List' where Brazilian Free-Tailed bats have been observed. (In case you did not write down the county names and cannot remember, the nine counties are: Baca, Garfield, Gunnison, LaPlata, LasAnimas, Mesa, Montezuma, RioGrande, and Saguache.) First click on BACA and notice that the reverse video bar moves over the name to indicate that it is the current selection. Click on a color of your choice in the Toolkit Panel 'COLORS' box and this time toggle on the 'Lines' and 'Polygons' buttons so the color will be used for both the outline and fill pattern of the county polygon. After exiting the COLOR SELECTION dialog, make the polygon fill solid by clicking on the second box down under 'SHADES' in the Toolkit. Note that each time you add or change an attribute, the 'CURRENT' box is updated.

SHADES



Select 'Redraw' ('View' menu) to check your progress. Your display should look similar to the illustration below.

Complete the Map by selecting similar display attributes for the other eight IDs on the List, repeating the procedure outlined in the previous paragraph for each ID name. (In the next section, a way to assign attributes to more than one ID at a time will be demonstrated.)

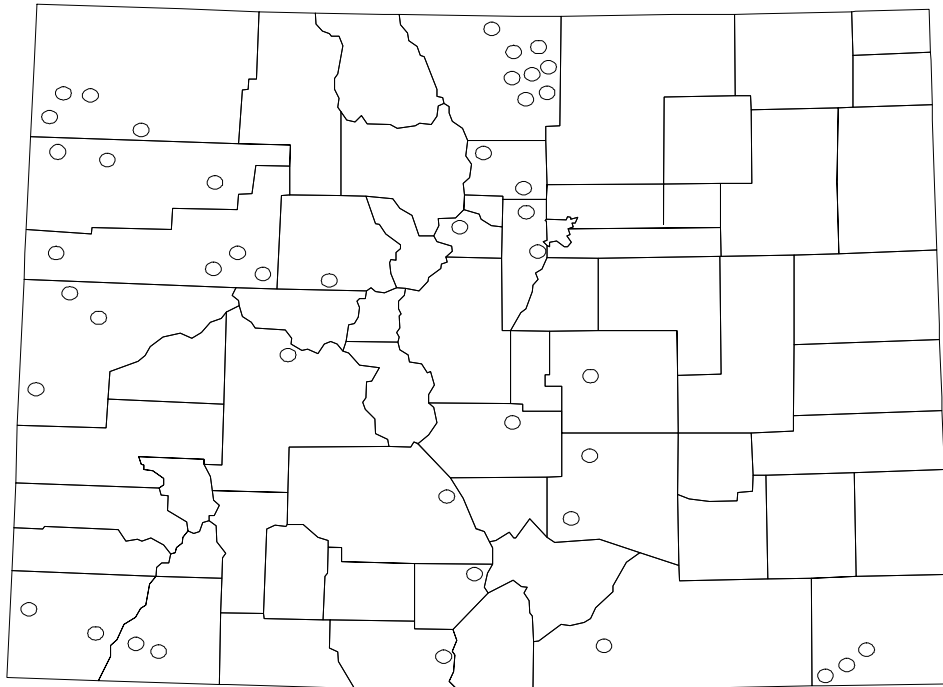


When you have finished assigning attributes and are satisfied with your display (check it with 'Redraw'), select 'Save as' from the 'Map' menu. Enter a descriptive name of eight characters or less (eg., BRFRTAIL) for the Map name. The information on the 'Map List' will be saved to a file with the extension .QMM. For more detail on the .QMM file, see the section on 'Data Structures Used by QuickMAP' in chapter 2. The COLOBAT mapfile itself will not be altered. When you are finished with this Map, clear the 'Map List' and work area with 'New' ('Map' menu).

Make a Map with Groups

The next Map to be made will show the distribution densities of the Townsend's Big-Eared Bat in Colorado counties. To gather the necessary information, first Load the COUNTIES view and Add the TWNSBIGEAR ID to the 'Map List'. A 'Redraw' should show the bat data points in various Colorado counties, as illustrated below.

Townsend's Big-Eared Bat Observation Sites in Colorado Counties

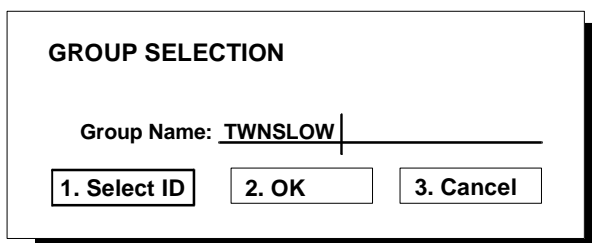


By comparing with the county names map, make a note of the following: names of those counties showing 1 or 2 observation sites; counties showing 3 observation sites; and counties showing 4 or more sites. There should be 14 county names in the first category, 3 in the second, and 3 in the last.

Clear the 'Map List' and work area ('New', 'Map' menu) in preparation to create a new Map. Select '2. Abandon' on the alert since you do not wish to save the current 'Map List'. Once again,

you will need all 63 Colorado counties on the 'Map List', so begin the process by Opening the COUNTIES Map. Then select 'Redraw' ('View' menu) to draw the counties in the work area.

Now you need to assign display attributes to distinguish between the three distribution densities (1 to 2 observation sites, 3 sites, and 4 or more sites). Instead of assigning attributes to one county at a time, you will make Groups of the different distribution densities and assign attributes to an entire Group. Select 'Make Group' from the 'Modify' menu. On the dialog that appears, enter TWNSLOW (for Townsend Low Density) or some other appropriate name for the Group. Then select button '1. Select ID' and the mouse cursor will be replaced by a pointing hand cursor. Use this cursor to click on the names of the 14 counties containing 1 to 2 observation sites.

A screenshot of a software dialog box titled "GROUP SELECTION". It features a text input field labeled "Group Name:" with the text "TWNSLOW" entered. Below the input field are three buttons: "1. Select ID", "2. OK", and "3. Cancel". The "1. Select ID" button is highlighted with a black border.

GROUP SELECTION

Group Name: TWNSLOW

1. Select ID **2. OK** **3. Cancel**

(The counties are: Alamosa, Boulder, ClearCreek, Conejos, Eagle, ElPaso, Fremont, Gunnison, Jefferson, LaPlata, LasAnimas, Montezuma, Pueblo, and Saguache.) Be sure to check carefully for any ID names that are highlighted and do not belong in the Group. You may de-select such entries by clicking on them again. When the appropriate 14 names are highlighted by reverse video bars, click on button '2. OK' on the dialog. All the highlight bars except one will disappear. If the reverse video bar was over a Group member originally, it will highlight the last ID selected for the Group. All of the Group members will be marked on the 'Map List' with a "check" to the left of their names and the Status Line above the work area will be updated to show the Group name.

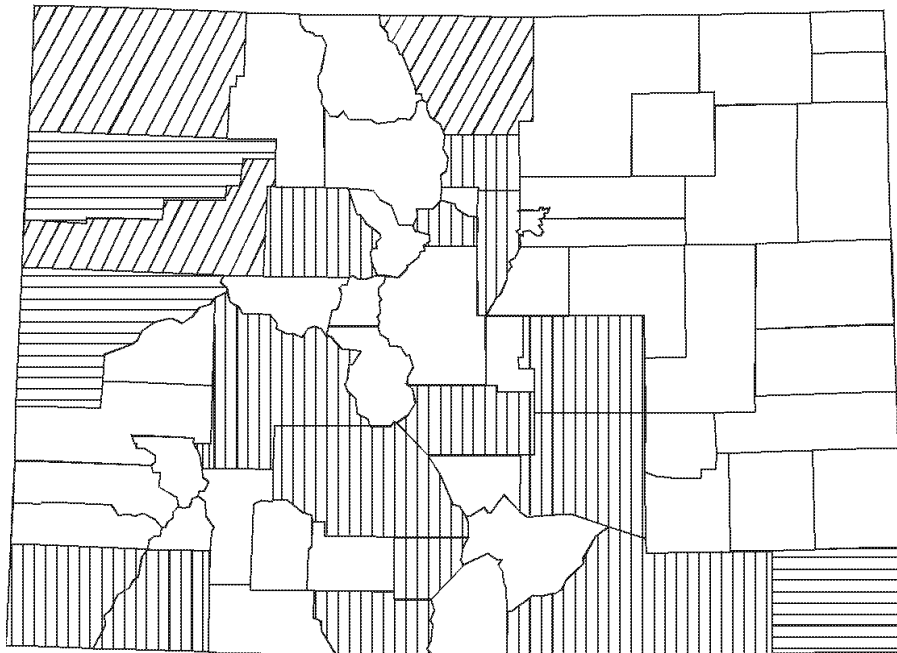
Before beginning to assign attributes to the Group, make sure that the reverse video bar is highlighting the name of a member of the Group and the Group name is showing on the Status Line. Proceed as before to select a color for both 'Lines' and 'Polygons' from the Toolkit. Then select a fill pattern for the Group counties by clicking on either the third or fourth box down under 'SHADES'. The third box displays a dialog with 21 fill patterns from which to choose, and box four displays eight hatch patterns. Select by clicking in the box showing the pattern of your choice. When you have selected a color and pattern for the TWNSLOW Group, 'Redraw' ('View' menu) the Map to check your progress.

Using the same procedures as described for the low density distribution, make a Group of the medium density counties (Baca, Mesa and RioBlanco) and assign a color and fill pattern for this Group. Then complete the Map with a high density distribution Group (Garfield, Larimer and Moffat counties) and assign distinguishing display attributes. You may experiment and change colors, fill patterns, etc. all you wish. To see attribute changes, 'Clear' ('View' menu) the work area first and then 'Redraw'. When you are satisfied with your Map, save it under a new Map name ('Save as', 'Map' menu). The Group information will be saved with the Map (.QMM file). To demonstrate this, first clear the 'Map List' and work area ('New', 'Map' menu). Activate the 'Map' menu and select 'Open'. On the dialog, enter the name under which you saved the

Townsend's distribution Map and, after the county names are all listed on the 'Map List', use 'Redraw' to draw the Map on the screen.

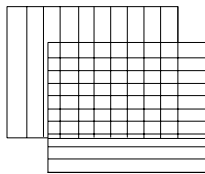
You may make an output file that may be sent to a printer or computer screen by selecting 'Output' from the 'Map' menu. The 'SAVE GEM FILE' dialog will request a name for the output file (the extension .GEM is automatically provided), and you may select the type of output device (printer or screen) and the page orientation (portrait or landscape). Once such a file is created, it may be printed or displayed using the GEM Output Utility, which came with QuickMAP. An example of a Map prepared by following this exercise and making a printer output file is illustrated below. To actually output this file to screen or printer, you should go to the GEM Output Utility by selecting 'Output' from the 'File' menu in QuickMAP's GALLERY.

Distribution of Townsend's Big-Eared Bats in Colorado Counties



In addition to the tools used in this exercise, the Toolkit Panel offers a choice of 'MODES' and 'LINES'. You may wish to experiment with their use on your own.

MODES



Clicking on the boxes toggles between "transparent" and "opaque" display mode. In transparent mode, whatever is beneath can be seen through the currently selected ID. IDs are displayed in the order in which they are entered on the 'Map List' so that the most recently entered ID is "on top of" the others in the work area. Thus, the first ID on the 'Map List' would be beneath all others in the work area. In opaque mode, IDs "on top" obscure those "beneath".

LINES

Clicking on one of the boxes selects the line display type used for "line" data and for the outlines of polygons in the currently selected ID. The selections include several combinations of dots and dashes as well as different width solid lines.

Calculate Area, Perimeter, Distance

DISPLAY's 'Calculate' menu offers commands that will complete some simple calculations on the currently open Map List. Of the Colorado counties in the Map you just created, Larimer county has the highest concentration of Townsend's Big-Ear bats. Suppose you need some background data for a report, including the area of Larimer county.

First select Larimer county by clicking on the name in the 'Map List'. Then activate the 'Calculate' menu and select 'Area'. "LARIMER" will be automatically entered for the ID name on the AREA CALCULATION dialog. (You may also edit this default entry if desired.) Select button '2. Total' for the total area of the Larimer county ID. Another dialog will appear to report the area of the ID in the units of measurement in effect for the Colobat mapfile. (The units may be changed, if desired, using the 'Select Units' command in the GALLERY 'Options' menu.) Click on '2. OK' to clear the area reporting dialog.

AREA CALCULATION

MapID: LARIMER

1. Polygon

2. Total

3. Cancel

For demonstration purposes, again select ‘Area’ from the ‘Calculate’ menu. Leave LARIMER as the ID name, but this time select button ‘1. Polygon’. The dialog will disappear and the Status Line will display the message ‘Select desired polygon’. Click in the middle of Larimer county in the work area. The dialog to report area will appear, and should have the same measurement as reported previously for ‘Total’. This time, though, the outline of Larimer county will be changed to a color complementary to that in which it is displayed; depending on the color used, it may seem to disappear. The ‘Polygon’ area selection is meant to be used for an ID that consists of more than one polygon, so areas of the individual polygons may be calculated. The outline color is changed to confirm which polygon area is currently being calculated.

DISPLAY also will calculate polygon perimeters. Select 'Perimeter' from the 'Calculate' menu. Again, the ID currently selected in the 'Map List' is entered as a default on the dialog that appears. Select button '2. Total' for the total of all perimeters in the ID, in this case, the perimeter of Larimer county. The '1. Polygon' button works similarly to the corresponding choice on the AREA CALCULATION dialog: the perimeter of a single selected polygon is calculated and is marked with a complementary color.

DISTANCE CALCULATION

MapID: LARIMER

1.

Airline

2.

Along Line

3.

to Edge

4.

Cancel

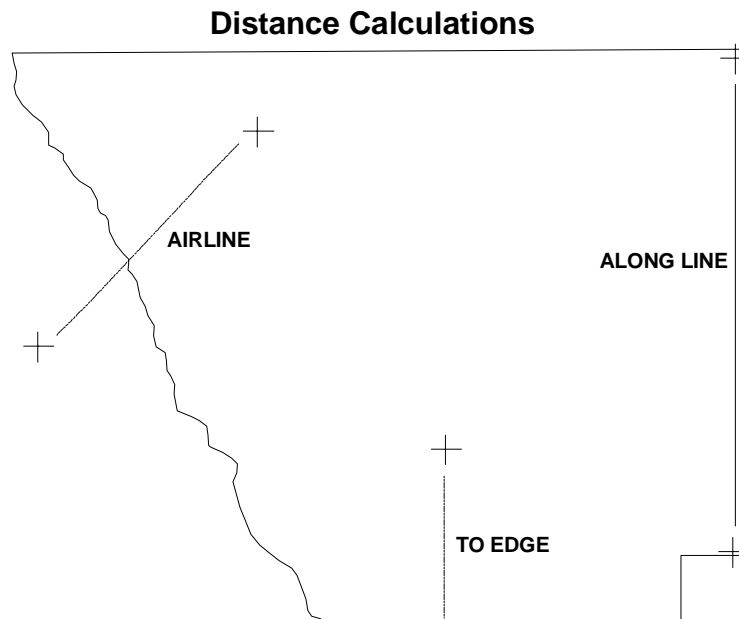
The distance between two points selected by the user may also be calculated. First, "window in" on Larimer county to make it easier to see ('Window view', 'View' menu). Then select 'Distance' from the 'Calculate' menu. If LARIMER was still selected in the 'Map List', it should appear as the default on the DISTANCE CALCULATION dialog. Select button '1. Airline'. The dialog will disappear and the Status Line will direct you to 'Identify start and end points'. You may click at any two positions anywhere in the work area and the distance between those points "as the crow flies" will be reported. The two points need not lie within the currently selected polygon.

Clear the distance reporting dialog by selecting '2. OK'.

Again select 'Distance' from the 'Calculate' menu and this time choose button '2. Along Line'. The message on the Status Line will be 'Identify two points on a line'. Click on the upper and lower right-hand corners of the Larimer county outline. The distance between the corners will be reported and the actual line used for the calculation will be shown in a complementary color. (Be sure to read the description of the 'Distance' menu item in chapter 4 for more detail; the actual mechanics of this calculation are slightly more complicated than is immediately apparent.) While the distance reporting dialog is still showing, select button '3. Complement', and the length of the remainder of the polygon outline (the rest of the LARIMER county border) will be reported. Select button '2. OK' to exit the distance reporting dialog.

Finally, select 'Distance' calculation again and choose button '3. to Edge' on the dialog. When the Status Line displays the message 'Identify point', you may click on a point anywhere within the Larimer county polygon. The distance between that point and the closest polygon edge will be reported.

You may continue to explore the options offered by the DISPLAY module or you may 'Quit' QuickMAP from the 'Map' menu.



Overviews and Descriptions of the QuickMAP Menus

GALLERY Menus

File Menu

File	Information	Options	GALLERY
New Open	QUICKMAP GALLERY Map is C:\QMAP\Manatee		
Export. . .			
Output Quit			

Moving the mouse cursor over 'File' in the menu bar at the top of the screen in the GALLERY activates a dropdown menu. The user may then select menu items or commands affecting mapfiles or databases. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'File'

menu are 'New', 'Open', 'Save as', 'Export', 'Output', and 'Quit'. Descriptions of how the individual menu items work are given below.

- **NEW**

Open a new mapfile. A dialog is displayed showing the name of the currently open mapfile and a list of mapfiles available on the current drive. Both the 'Directory' and 'Mapfile Selection' lines may be changed using the editing keys (Esc, backspace, arrow keys, etc.). If the drive:\directory designation is changed, the 'Mapfiles' list will be updated to show the maps available on the new directory. When a map name is typed in, a warning is issued if a mapfile by that name already exists. The user may 'Cancel' that entry and enter another map name, or may 'Continue', which will simply open the requested mapfile as if 'Open' had been selected from the 'Map' Menu. If a new, valid name is entered, an empty mapfile will be created with that name. Data may later be entered into that mapfile using the QuickMAP DRAW module or one of the import utilities.

- **OPEN...**

Open a (previously created) mapfile. A dialog is displayed showing the name of the currently open mapfile and a list of mapfiles available on the the current drive. Both the 'Directory' and 'Mapfile Selection' lines may be changed using the editing keys (Esc, backspace, arrow keys, etc.). If the drive:\directory designation is changed, the 'Mapfiles' list will be updated to show the maps available on the new directory. A mapfile may be selected by typing its name on the 'Mapfile Selection' line or by clicking on its name in the 'Mapfiles' list. Pressing <Enter> or clicking on '1. OK' will then open the desired mapfile. The dialog will disappear, and the GALLERY Status Line will change to reflect the name of the newly opened mapfile.

- **SAVE AS...**

***** CURRENTLY INACTIVE *****

- **EXPORT**

Export data in a 'MOSS Export' format from the currently open mapfile. A dialog is displayed for the user to select: '1. All MapIDs' to export the data comprising all mapIDs in the mapfile and to preserve the mapID topology in the export files; '2. Some MapIDs' to export only those mapIDs selected by the user, and to preserve the mapID structure in the export files; '3. Only Arcs' to export all arcs in the mapfile, and ignore topology; or '4. Cancel'. When '1. All MapIDs' is selected, a dialog informs the user of the formatting progress, naming each mapID, the type of feature exported, and the file to which it is written. When '2. Some MapIDs' is selected, a dialog is displayed for the user to enter one or more names of mapIDs to be exported. A message on the dialog informs the user if an invalid ID name is entered or the ID is not found in the currently open mapfile. The formatting progress is reported, giving the name of each mapID, the type of feature exported, and the file to which it is written. When '3. Only arcs' is selected, the name of each arc is reported as it is written to the export file. In all cases, three files are created on the mapfile directory for the MOSS Export data: filename.MEP for polygon data; filename.MEL for line data (or arc data if the 'Only arcs' option is being used); and filename.MEN for node, or point data. "Filename" is the same as the mapfile name. If the three files already exist (i.e., if 'Export' has been used previously with the same mapfile), they will always be overwritten and the data will be lost if more data is subsequently exported from the same mapfile.

- **OUTPUT**

Go to the GEM Output utility. GEM 'Output' provides for hard copy production of mapIDs and Maps that were saved to special .GEM files in the ASSEMBLY or DISPLAY modules.

(See 'Output' menu items in the 'MapID' menu of ASSEMBLY and in the 'Map' menu of DISPLAY.)

- **QUIT**

Exit QuickMAP.

Information Menu

File	Information	Options	GALLERY
	Help	MAP GALLERY	Map is C:\QMAP\Manatee
	List IDs		
	List Families		
	List Arcs		
	Mapfile Info		

Moving the mouse cursor over 'Information' in the menu bar at the top of the screen in the GALLERY activates a dropdown menu. The user may then make selections that provide information about the currently open mapfile. QuickMAP's on-line help is also activated from this menu. A menu item is selected by clicking on its name in the

dropdown menu. The choices in the 'Information' menu are 'Help', 'List IDs', 'List Families', 'List Arcs', and 'Mapfile Info'. Descriptions of how the individual menu items work are given below.

- **HELP**

Activates QuickMAP's on line help. A special help screen displays 'Help' information and listings of items for which help is available. A description of any GALLERY menu item is obtained by clicking on the item name in the dropdown menu while in 'Help' mode. Additional items for which help is available include cross references to related menu entries and operations and a glossary of mapping terminology.

- **LIST IDS**

All mapIDs in the currently open mapfile are listed alphabetically on the display screen. Buttons may be selected to 'Page Up' and 'Page Down' through lists covering more than one page.

- **LIST FAMILIES**

All families defined for the currently open mapfile are listed alphabetically on the display screen. Buttons may be selected to 'Page Up' and 'Page Down' through lists covering more than one page.

- **LIST ARCS**

All arcs in the currently open mapfile are listed alphabetically on the display screen. Buttons may be selected to 'Page Up' and 'Page Down' through lists covering more than one page.

- **MAPFILE INFO**

A dialog displays information about the currently open mapfile, including date created, projection system, number of arcs and mapIDs, locational coordinates, and scale. Size of the mapfile (in bytes) and available working space in computer memory are also given.

Options Menu

File	Information	Options	GALLERY
	QUIC	<div> Define Projection Register Mapfile Reset World Select Units </div>	Map is C:\QMAP\Manatee

Moving the mouse cursor over 'Options' in the menu bar at the top of the screen in the GALLERY activates a dropdown menu. The user may then select menu items or commands to set and save parameters that affect the entire QuickMAP package. Also, a utility to register a mapfile is included in this menu. A menu item is selected by clicking on its name in the

dropdown menu. The choices in the 'Options' menu are 'Define Projection,' 'Register Mapfile,' 'Reset World,' and 'Select Units'. Descriptions of how the individual menu items work are given below.

• DEFINE PROJECTION

Define the projection for the currently open mapfile, and store the projection information with the mapfile. 'Define Projection' should be used when a new QuickMAP mapfile is created, either by digitizing or importing data from another source. When a projection is defined for a mapfile, the information is written to the mapfile 'header' and becomes a part of the database, until changed by the user. Having a projection defined allows the use of 'Select Units' (GALLERY Options menu), and may also be important when exchanging QuickMAP data with other applications. The 'Define Projection' menu item does not re-project the mapfile coordinates; QuickMAP's 'PROJECT' Utility must be used for that purpose. When 'Define Projection' is selected, a dialog is displayed with the following list of projections: Degrees Latitude and Longitude, Universal Transverse Mercator, State Plane Coordinates, Albers Conical Equal Area, Lambert Conformal Conic, Mercator, Polyconic, and Others. When the dialog first appears, the projection of the currently open mapfile is selected, as indicated by its button appearing in reverse video. The user may select a different projection by clicking on the appropriate button, which will then appear in reverse video.

1) When 'Universal Transverse Mercator' (UTM) is selected, another dialog appears for the user to specify either a zone or longitude value that locates the currently open mapfile.

The user must first select either the 'Zone' or 'Longitude' button to indicate which type of value is being entered. Then a number is typed on the 'Enter value:' line. For the UTM projection, longitude values between + 180 and -180 and zones from 1 to 60 are valid. If a number outside these ranges is entered, an alert appears specifying the appropriate ranges, and a new value must be entered. Any longitude value that lies within a zone may be used to specify that zone; if a border longitude is given, the zone to the east is used.

2) When 'Albers Conical Equal Area' or 'Lambert Conformal Conic' is selected, a dialog appears for the user to enter information that references mapfile coordinates to the earth's surface. The following information must be provided: Latitude of the 1st Standard Parallel (southern-most); Latitude of the 2nd Standard Parallel; Longitude of the Central Meridian; Latitude of the Origin of Projection; False Easting and False Northing (corresponding to the intersection of the central meridian and the latitude of the origin of projection). Values are not checked for "compatibility", i.e., whether the values form a reasonable group that defines a legitimate projection (i.e., compatible with the PROJECT utility).

3) 'Others' may be selected for any projection not specifically included in the list. A dialog appears for the user to select units of measurement and a scale factor that relate the mapfile coordinates to the earth's surface. The choices for units are Inches, Feet, Miles, Millimeters, Meters, Kilometers, and Unknown.

For more information on the different projections referred to here, see: Lee, J.E., and J.M. Walsh. 1984. Map projections for use with the geographic information system. U.S. Fish Wildl. Serv. FWS/OBS-84/17. 60 pp.

- **REGISTER MAPFILE**

Register, or fit, one QuickMAP mapfile's coordinate system to another. In QuickMAP, mapfile registration adjusts the arcs of a Source mapfile to fit with the arcs of a Target mapfile. The default Target is the currently open mapfile, and it typically should have a projection specified. Corresponding control points must exist in the source and target mapfiles. Two to 10 points may be selected as control points from any arc in each mapfile. When 'Register Mapfile' is selected, a series of dialogs, alerts and messages guide the user through the fitting process. At completion, error information (angular, scaling and registration errors) is provided and a new mapfile containing the registered source data is created. An examples of the mapfile registration process is given in chapter 3 of this manual.

- **RESET WORLD**

Reset the minimum bounding rectangle of the currently open mapfile. The minimum bounding rectangle (MBR) is the smallest possible rectangle that will enclose all the arcs of the mapfile. When the MBR is reset from the GALLERY, the mapfile's world is redefined for all QuickMAP commands that use the MBR, such as 'World' views in all modules and 'Set World' in DRAW and DISPLAY. The mapfile header information is altered in the .QMT file, which is one of the four files comprising a QuickMAP mapfile. Thus, the newly defined MBR will stay in effect until it is again changed using 'Reset World.'

When 'Reset World' is chosen from the 'Options' menu, a RESET MAPFILE'S WORLD EXTENTS dialog appears. Choosing button '1. Extents of a MapID' produces another dialog for the user to supply the name of a mapID in the currently open mapfile. When the name of a valid mapID is entered and button '1. OK' selected, the mapfile world is set to the MBR of that mapID. If, on the RESET MAPFILE'S WORLD EXTENTS dialog, button '2. Extents of all MapIDs' is chosen, the world of the currently open mapfile is set to the MBR that will enclose all arcs comprising all mapIDs. Button '3. Cancel' clears the dialog without resetting the world.

- **SELECT UNITS**

Change the units of measurement used to report distance and area calculations ('Calculate' menu is in the DISPLAY module) for the currently open mapfile. A dialog is displayed that reports the coordinate units being used for the currently open mapfile and offers six choices of units. The options are: 'Inches and square Inches', 'Feet and Acres', 'Miles and square Miles', 'Millimeters and square Millimeters', 'Meters and Hectares', and 'Kilometers and square Kilometers'. The user may select the units by clicking on the appropriate button. The units selected remain in effect for that mapfile, even if QuickMAP is exited, until changed again by the user. This feature is only available if the mapfile projection has been defined (see 'Define Projection' in 'Options' menu of the GALLERY).

GALLERY Menu

File	Information	Options	GALLERY
QUICKMAP GALLERY		Map is C:\QMAP\	GALLERY Info

			DRAW
			ASSEMBLY
			DISPLAY

			Enter GEM
			Enter DOS

Moving the mouse cursor over 'GALLERY' in the menu bar at the top of the screen in the GALLERY activates a dropdown menu from which the user may enter other QuickMAP modules, the GEM desktop, or DOS. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'GALLERY' menu include 'GALLERY Info,' 'DRAW', 'ASSEMBLY', 'DISPLAY', 'Enter GEM',

and 'Enter DOS'. Descriptions of how the various program modules can be used are given in section 3 of this manual ('An Overview and Tour of QuickMAP's Operation').

- **GALLERY INFO**

Shows the QuickMAP logo and software version number on the display screen.

- **DRAW**

Go to the DRAW module. DRAW offers a variety of options for entering, editing and viewing arc data. Data points can be entered directly on the screen using a mouse or via a digitizing tablet. The DRAW module also provides 'Register Tablet' that conforms a paper map on the digitizing tablet to an existing QuickMAP mapfile.

- **ASSEMBLY**

Go to the ASSEMBLY module. ASSEMBLY offers options to assemble arcs that share a common attribute into mapIDs. The topology, or spatial relationship of points, lines, and areas of mapIDs may also be built and edited.

- **DISPLAY**

Go to the DISPLAY module. DISPLAY provides options for composing thematic maps from mapIDs, using a wide variety of display parameters, and for simple spatial computations such as area, perimeter and distance.

- **ENTER GEM**

Temporarily switches from QuickMAP to the GEM Desktop. The main GEM screen replaces the QuickMAP GALLERY and any GEM applications installed on the user's system may then be entered in the usual manner. To return to QuickMAP's GALLERY, click on 'Exit to DOS' in the GEM Desktop 'File' menu. All files are closed and most memory is deallocated prior to leaving QuickMAP, but about 120K of memory is still not available while using the desktop. If a mapfile was open prior to leaving QuickMAP, it is opened upon returning from the GEM Desktop.

- **ENTER DOS**

Temporarily switches from QuickMAP to DOS. QuickMAP (and graphics mode) is exited and the DOS prompt for the currently active directory appears. The user may then execute DOS commands in the usual manner. QuickMAP may be reloaded at any time by typing "exit" and pressing < Enter>. The GALLERY and any previously open mapfile will be re-opened. When DOS is entered by using this menu item, TSR programs are not removed to free memory as when one exits QuickMAP by clicking on 'Quit' in the appropriate menu in the GALLERY, DRAW, ASSEMBLY, or DISPLAY module. (See the description of the QM.BAT file in part one of this manual for more information on TSRs.) In addition, the QuickMAP kernel remains in memory, consuming about 120K of available memory, and there may be insufficient memory to run major applications such as WordPerfect.

DRAW Menus

Arc Menu

Arc	Modify	View	Information	Options	DRAW
New. . .		ATEE	Arc: UNTITLED	Length: 0	Buffer Length: 0
Open. . .					
Append. . .					
Save/Next					
Save as. . .					
Delete. . .					
Abandon					
Quit					

Moving the mouse cursor over 'Arc' in the menu bar at the top of the screen in the DRAW module activates a dropdown menu from which the user may select operations affecting arcs. A menu item is selected by clicking on its name in the dropdown menu on the computer display, or by digitizing on its name on the paper menu if in tablet mode. The choices in the 'Arc' menu are: 'New', 'Open', 'Append', 'Save / Next', 'Save as', 'Delete', 'Abandon', and 'Quit'. Descriptions of how

the individual menu items work are given below.

- **NEW**

Create an untitled arc containing no points. The status line is reset to reflect 'Arc:UNTITLED', 'Length:0', and 'Buffer length:0'. The screen is cleared of any existing arcs. If a newly digitized or edited arc is on the screen, an alert is displayed for the user to choose whether to '1. Save', or '2. Abandon' the arc or to '3. Cancel' the 'New' selection. If '1. Save' is selected and the arc is untitled, a dialog is displayed and the user may enter a name for the arc to be saved or may cancel the 'New' selection. If the buffer contains data when the '1. Save' is selected, another dialog is displayed from which the user may choose to '1. Append' or '2. Abandon' the data in the buffer or to '3. Cancel' the 'New' selection.

- **OPEN...**

Open (load) an existing arc or, if it does not exist, create it. A dialog is displayed for the user to enter the name of the arc to be opened. If an arc is already open (and named on the status line) when 'Open' is selected, the family name of that arc will automatically be entered on the dialog and may be edited or replaced. If the arc name entered by the user exists, it is drawn and the status line changed to reflect its name and length.

If the arc name entered is nonexistent but the family name exists, a message appears on the dialog saying that a new arc will be created and given the number requested by the user. The user may continue by selecting '1. OK' or may '2. Cancel' the 'Open' command. If '1. OK' is selected, the screen is cleared and the status line is changed to reflect the new arc name and length of zero. If neither the arc nor family name given exists, a message on the dialog informs the user that the family does not exist, but will be created and the arc number requested by the user will be opened if the user continues.

Alternatively, only a family name may be entered. If the family name exists, a message on the dialog informs the user that a new arc with the number requested by the user will be created. If the family does not exist, the user is informed that the family does not exist, but will be created if the user continues.

If an arc that has not been saved is on the screen at the time of an 'Open', an alert is displayed for the user to choose whether to '1. Save' or '2. Abandon' the arc or to '3. Cancel' the 'Open' selection. The default is '3. Cancel', and may be selected by pressing <Enter>. If '1. Save' is selected, a dialog is displayed and the user may enter a name for the arc to be saved or may cancel the 'Open' selection. If the buffer contains data when '1. Save' is selected, another dialog is displayed from which the user may choose to '1. Append' or '2. Abandon' the data in the buffer or to '3. Cancel' the 'Open' selection.

- **APPEND...**

Append a stored arc to the current arc. A dialog is displayed for the user to enter the name of an arc to be appended. If an arc is already open (and named on the status line) when 'Append' is selected, the family name of that arc will automatically be entered on the dialog and may be edited or replaced. The display is redrawn with the last point of the current arc connected to the first point of the appended arc. The status line changes 'Length' to reflect the sum of the points in both arcs. Arcs can be inserted anywhere when 'Append Arc' is used in conjunction with 'Insert Before'.

If appending an arc would exceed the maximum arc length allowed (including the buffer length), the user is alerted and the 'Append' is automatically cancelled.

- **SAVE/NEXT**

Save an arc and create the next unused arc in that family. The current arc is saved, then the screen is cleared and the status line changed to reflect the new arc name and zero length. A 'Save/Next' clears any data in the buffer (see 'Insert Before'), so if buffer data is about to be lost, a dialog is displayed offering the options of appending or abandoning the data. Also, if

the maximum number of arcs per family (999) is reached with the current arc, a dialog announces that the current arc has been saved but no numbers are available for a 'Next'. If the arc about to be saved is a null, or empty arc, the dialog displays a message informing the user and asking whether to continue. If 'Save/Next' is selected when an 'Untitled' arc is on the screen (a new arc that has not been saved), a 'Save As' is performed prior to the 'Next' arc being created.

In tablet mode, 'Save/Next' may be selected by pressing button 2 on the tablet cursor, making it easier to save an arc and continue digitizing from the same point on the map.

- **SAVE AS...**

Save an arc under a new name or the same name and keep that arc currently open; can be used to name a new or untitled arc or to save an edited arc under a new or its existing name. If a previously named arc is being edited, a dialog is displayed with the arc name automatically entered. The user may accept the name as is or edit it. If a new name is given and an arc by that name already exists, the user is asked for confirmation before the existing arc is overwritten. If the arc about to be saved is a null, or empty arc, the dialog displays a message informing the user and asking whether to continue. The default response on the 'Save as' dialog, selected by pressing <Enter>, is '2. Cancel'. To complete a 'Save as', '1. OK' must be selected by clicking on the button or by pressing function key F1.

- **DELETE...**

Delete a stored arc. A dialog is displayed for the user to enter the name of the arc to be deleted. There is no default arc for deletion, even if an arc is currently open on the screen. If the arc name entered by the user belongs to any mapIDs, a dialog is displayed advising that the arc cannot be deleted until the associations with mapIDs have been removed. (MapIDs can be deleted or modified in the ASSEMBLY module.) If the arc has been newly created and not yet stored, the dialog displays a message saying the arc does not exist. The default response on the 'Delete' dialog, selected by pressing <Enter>, is '2. Cancel'. To complete a 'Delete', '1. OK' must be selected by clicking on the button or by pressing function key F1.

- **ABANDON**

Abandon an edited arc. A dialog is displayed asking the user to confirm before abandoning the current arc. If there is data in the buffer, the user is informed that it will be lost. If the user chooses to continue with the 'Abandon', the screen is cleared, the original arc (before editing) is redrawn, and all changes made since it was last saved are lost. If the current arc

is 'Untitled' (is new and has not been saved), selecting 'Abandon' is equivalent to selecting 'New'.

- **QUIT**

Exit DRAW and QuickMAP, without returning to the Gallery. If an arc that has not been saved is on the screen at the time 'Quit' is selected, an alert is displayed for the user to choose whether to '1. Save' or '2. Abandon' the arc or to '3. Cancel' the 'Quit' selection. '3. Cancel' is the default and may be selected by pressing < Enter>. If '1. Save' is selected and the arc is untitled, a dialog is displayed and the user may enter a name for the arc to be saved or may cancel the 'Quit' selection. If the buffer contains data when '1. Save' is selected, another dialog is displayed from which the user may choose to '1. Append' or '2. Abandon' the data in the buffer or to '3. Cancel' the 'Quit' selection.

Modify Menu

Arc	Modify	View	Information	Options	DRAW
Mapf	Insert Before Insert Close ----- Delete with Cursor Delete with Keyboard Delete All Points ----- Delete Last Point		NTITLED	Length: 0	Buffer Length: 0

Moving the mouse cursor over 'Modify' in the menu bar at the top of the screen in the DRAW module activates a dropdown menu. The user may then select menu items or commands to modify or edit the currently open arc. A menu item is selected by clicking on its name in the dropdown menu on the computer display, or by digitizing on its name on the paper menu if in tablet mode. The choices in the 'Modify' menu include: 'Insert Before', 'Insert

Close', 'Delete with Cursor', 'Delete with Keyboard', 'Delete All Points', and 'Delete Last Point'. Descriptions of how the individual menu items work are given below.

- **INSERT BEFORE**

Insert data into the current arc, prior to a point defined by the user. When 'Insert Before' is selected, the status line displays the message 'Identify point to Insert Before'. The user selects a point with the (mouse or tablet) cursor, and all data following and inclusive of that point are stored in the buffer. The status line reflects the change in 'Buffer length'. All subsequent operations, including deleting and finding points and redrawing, will ignore the data in the buffer until insert mode is closed (see 'INSERT CLOSE' below).

- **INSERT CLOSE**

Append the contents of the buffer to the current arc. This reverses the insert mode described in 'Insert Before'. The data stored in the buffer are appended and are included in all subsequent operations. The arc is redrawn and the point "flagged" to 'Insert Before' is connected to the last non-buffer point in the arc.

- **DELETE WITH CURSOR**

Delete a point, or points, identified by the user clicking with the cursor. When 'Delete with Cursor' is selected, the status line is cleared and displays the message 'DELETE MODE for

Arc (ARCNAME)'. If the user is in screen input mode, the mouse cursor becomes a "pointing hand", indicating that the function keys are inactivated. If the user is in tablet input mode, the function keys are also inactivated but no indication appears on the screen. Five control buttons are displayed at the bottom of the screen. The user may select points for deletion by clicking on or near any points in the currently displayed arc or by using control buttons 1 or 2. Whatever point is closest to where the user clicks is marked with a red box, the status line shows 'Marked: Point (POINT NUMBER)', and the point number is added to a list of points to be deleted. If two or more points with identical locations exist in an arc, the one with the lowest point number is considered to be the closest. The user may mark as many points in the arc as desired by clicking, and may also use the '1. Last' button to automatically add the last point in the arc to the delete list.

Selecting button '2. Range' will mark all points between and including the two most recently marked by the user and will add this range as one item to the delete list. The status line will show 'Marked: Range (POINT NUMBER - POINT NUMBER)'. If '2. Range' is selected when less than two points have been marked or when the last two entries in the delete list are not two singly identified points, the status line displays the message 'Range requires 2 points', and the user may continue the operation.

At any time during the process, button 3, 4, or 5 may be selected. Button '3. Restore' removes the most recently added item from the delete list and "unmarks" the points included in that item. The status line shows 'Restored: Point or Range (NUMBERS)'. Selecting '4. OK' completes the deletion process, ie., all points and/or ranges of points currently in the delete list are deleted. The edited arc is redrawn and the status line shows the decrease in arc 'Length'. Selecting '5. Cancel' removes all markers from the arc and returns the user to digitizing mode without deleting any points.

- **DELETE WITH KEYBOARD**

Delete a point, or points, identified by the user entering point numbers at the keyboard. When 'Delete with Keyboard' is selected, a dialog is displayed for the user to type in point numbers or ranges of point numbers to be deleted. The individual entries should be separated by commas, and ranges shown as ##-##. The usual keys (backspace, escape, arrow keys, etc.) can be used to edit mistakes. Selecting control button '1. Last' automatically enters the last point number from the currently displayed arc. If '2. More' is chosen, the line on the dialog is cleared so more point numbers can be entered. (Those point numbers already entered are "remembered".) Button '2. More' is the default and can also be selected by pressing <Enter>. Control button '4. Cancel' terminates the operation without deleting points and returns the user to digitizing mode. If control button '3. Done' is selected, the dialog disappears, and all

entered point numbers are marked with red boxes on the display. The status line asks 'Delete the marked points?' and choices '1. OK' and '2. Cancel' are offered. '1. OK' deletes the marked points, then redraws the edited arc. '2. Cancel' clears all markers from the currently displayed arc without deleting any points. In either case, the user is returned to digitizing mode.

- **DELETE ALL POINTS**

Clear all points from the display. As a safeguard, an alert first appears asking the user to confirm that all points should be deleted. When the deletion is complete, the status line changes the 'Length' to 0 but leaves the 'Arc' name as is. Data in the buffer (resulting from 'Insert Before') are not considered to be part of the current arc, and are not deleted. This command affects only the currently open arc. To delete a stored arc, 'Delete...' in the 'Arc' menu must be used.

- **DELETE LAST POINT**

Delete the last point from the current arc. The display is redrawn with the last point eliminated, and the status line changes to reflect the change in 'Length'. Data in the buffer (resulting from 'Insert Before') are not considered to be part of the current arc, and are not affected by this command.

View Menu

Arc	Modify	View	Information	Options	DRAW
Mapfile: MAN		World View Arc View Window View Zoom View Shift View Redraw Overlay. . . ----- Find Point(s)	TITLED	Length: 0	Buffer Length: 0

Moving the mouse cursor over 'View' in the menu bar at the top of the screen in the DRAW module activates a dropdown menu. The user may then select menu items or commands to change the magnification and content of the view on the computer display. A menu item is selected by clicking on its name in the dropdown menu on the computer display, or by digitizing on its name on the pa-

per menu if in tablet mode. The choices in the 'View' menu include: 'World View', 'Arc View', 'Window View', 'Zoom View', 'Shift View', 'Redraw', 'Overlay', and 'Find Point(s)'. Descriptions of how the individual menu items work are given below.

- **WORLD VIEW**

Draw or redraw on the display screen the current arc, with the window defined by the current 'World View' as selected in 'Set World' (see 'Set World' under 'Options Menu'). The default value for 'World View', and the one in effect if no 'Set World' has been executed, is a minimum bounding rectangle that can contain the extents of all arcs in the currently open mapfile. Once selected, 'World View' will stay in effect until the user selects another "view" or until DRAW is exited.

- **ARC VIEW**

Redraw the current arc on the screen with the window defined by the minimum bounding rectangle of the current arc. Once selected, arc view will stay in effect until the user selects another "view" or until DRAW is exited.

- **WINDOW VIEW**

Redraw the current arc on the screen with the window defined by the user. When 'Window View' is selected, the status line displays the message 'Identify two opposite corners of a

Window View' and the mouse pointer becomes a cross-hair cursor. The user marks with the cursor two diagonally opposite corners that define a box around that part of the display that is of interest. The window is illustrated on the screen by a solid-lined box and the user is asked to confirm that this is the desired view. Control buttons offer choices to '1. OK' (approve the defined window), '2. Retry' or '3. Cancel' the operation. The window contents will be expanded to occupy the entire viewing area of the screen. Once selected, 'Window View' will stay in effect until the user selects another "view" or until DRAW is exited.

- **ZOOM VIEW**

Redraw the current arc on the screen to a multiple or fraction of the existing scale, and centered at a point selected by the user. When 'Zoom View' is selected, the status line displays the message 'Identify center of zoom view'. User clicks the cursor at the desired spot. Whatever spot is marked becomes the center of a "zoom lens" and is indicated by crossing lines on the display. A dialog is then displayed for the user to enter a magnification factor. Numbers smaller than 1 result in a display smaller than the existing one (zoom out); numbers larger than 1 result in a magnified display (zoom in). For example, entering "0.5" will redraw the arc at 1/2 the existing size; entering "5" will redraw the display at 5 times the current size. Once selected, a 'Zoom View' will stay in effect until the user selects another "view" or until DRAW is exited.

- **SHIFT VIEW**

Clear the display window and draw the currently open arc shifted in a direction specified by the user. First the status line displays the message 'Identify corner of shifted view'. Whatever point is marked by the user (by clicking the cursor) becomes the intersection of two lines that divide the window into four quadrants. The status line then displays the message 'Identify quadrant of shifted view'. Six control buttons are displayed and the user may choose which quadrant of the four will be displayed by selecting button 1, 2, 3, or 4; '5. Retry' positioning the corner of the shifted view; or '6. Cancel' the operation without changing the display. Once selected, a 'Shift View' will stay in effect until the user selects another "view" or until DRAW is exited.

- **REDRAW**

Clear the display and redraw the current arc on the screen to the existing scale.

- **OVERLAY**

Draw an arc or mapID of the user's choice without first clearing the screen, thus overlaying it on the existing display. A dialog is displayed for the user to enter the name of an arc or ID, and to select one of three control buttons. Either an arc or mapID name is entered and the corresponding button '1. Arc' or '2. ID' (the default) selected. The arc or ID is drawn over the existing display. If an invalid arc or ID name is entered or the inappropriate button selected, a message warns the user and he may try again. The other choice is button '3. Cancel'. The default display colors for overlays are red for arcs and blue for IDs. Overlaid arcs/IDs may be cleared from the screen by selecting any menu item that clears the display.

- **FIND POINT(S)**

Mark a point identified by the user and display its point number in the status line. When 'Find Point(s)' is selected, the status line displays the message 'Identify point' and the user clicks the cursor on or near the desired point. The closest point is then marked with a magenta asterisk. If two or more points with identical locations exist in an arc, the one with the lowest point number is considered to be the closest. The status line displays the number of the point marked. Four control buttons are displayed near the bottom of the screen. Clicking on button '1. Reselect' "unmarks" the currently marked point by changing the magenta asterisk to a complementary color, resets the status line back to 'Identify point', and clears the control buttons so the operation can be reinitiated. Button '2. Next' "unmarks" the currently marked point, marks the next higher numbered point with a magenta asterisk, and updates the status line to show the point now marked with a magenta asterisk. The control buttons remain so the process of finding points can be continued. Button '3. Prior' works the same as button '2. Next', except points are located in the opposite direction, ie., each preceding (lower numbered) point is found. If '2. Next' or '3. Prior' is selected after the end of the current arc is reached, the computer beeps but all else (control buttons, etc.) will remain the same. Selecting '4. Cancel' causes the display to be redrawn with no points marked, the status line to be reset, and the control buttons to be cleared. The user is returned to digitizing mode.

'Find Points' can be used with 'Show Coordinates' ('Options' menu) to determine the X and Y values for a coordinate already in an arc.

Information Menu

Arc	Modify	View	Information	Options	DRAW
Mapfile: MANATEE			Help		Buffer Length: 0
			<div> <div>-----</div> <div> List Families List Arcs List Arcs in Family. . . List Unused Arcs in Family. . . List IDs with Arc. . . List IDs </div> </div>		

Moving the mouse cursor over 'Information' in the menu bar at the top of the screen in the DRAW module activates a dropdown menu. The user may then make selections that provide information about arcs and their associations into families and mapIDs. A menu item is selected by clicking on its name in the dropdown menu on the computer display, or by digitizing on its name on the paper menu if in tablet

mode. The choices in the 'Information' menu are: 'Help', 'List Families', 'List Arcs', 'List Arcs in Family', 'List Unused Arcs in Family', 'List IDs with Arc', and 'List IDs'. Descriptions of how the individual menu items work are given below.

- **HELP**

Activates QuickMAP's on line help for the DRAW module. A special help screen displays 'Help' information and listings of items for which help is available. A description of any DRAW menu item is obtained by clicking on the item name in the dropdown menu while in 'Help' mode. Additional items for which help is available include cross references to related menu entries and operations and a glossary of mapping terminology.

- **LIST FAMILIES**

All families in the currently open mapfile are listed alphabetically on the screen. If more than one "page" or display screen is required for the list, the program pauses after each page and the user can choose to 'Page Up' or 'Page Down' to move about in the list.

- **LIST ARCS**

All arcs in the currently open mapfile are listed in alphabetical order. The option of paging up or down through extended lists is available.

- **LIST ARCS IN FAMILY...**

All arcs in a family of the user's choice are listed on the screen in numeric order. A dialog is displayed for the user to enter the desired family name. If an arc has been opened prior to selecting 'List Arcs in Family', that arc's family name will be entered automatically and the user may choose it simply by pressing <Enter>, or may enter a different family name. All arcs belonging to that family are then listed. As with 'List Arcs', choices of paging up or down through extended lists are available.

- **LIST UNUSED ARCS IN FAMILY...**

The user chooses a family name as described for 'List Arcs in Family'. If there are unused arc numbers in the sequential arc list, they are reported. At the end of the list, the last (highest) arc number that is currently in use for that family is listed as "last existing arc". The option of paging up or down in extended lists is available.

- **LIST IDS WITH ARC...**

A dialog is displayed for the user to enter the name of an arc. If an arc has been opened prior to selecting 'List IDs with Arc', that arc's name will be entered automatically and the user may choose it simply by pressing <Enter>, or may enter a different arc name. All mapIDs with which the arc is associated are listed on the screen in alphabetical order. The option of paging up or down through extended lists is available.

- **LIST IDS**

All mapIDs in the currently open mapfile are listed alphabetically on the display. Paging up and down through extended lists is available.

Options Menu

Arc	Modify	View	Information	Options	DRAW
Mapfile: MANATEE			Arc: UNTITL	Draw Input Mode Locate Tablet Menu Set World ----- Register Tablet ----- Show Coordinates Show Ticks Hide Direction	fer Length: 0

Moving the mouse cursor over 'Options' in the menu bar at the top of the screen in the DRAW module activates a dropdown menu. The user may then select menu items or commands to customize the DRAW environment. A menu item is selected by clicking on its name in the dropdown menu on the computer display, or by digitizing on its name on the paper menu if in tablet mode. The choices in the 'Options' Menu are:

'Draw Input Mode', 'Locate Tablet Menu', 'Set World', 'Register Tablet', 'Show/Hide Coordinate Values', 'Show/Hide Ticks', and 'Show/Hide Direction'. Descriptions of how the individual menu items work are given below.

- **DRAW INPUT MODE**

Toggle between tablet and screen input modes. Selecting 'Draw Input Mode' from the display screen menu transfers control to the digitizing tablet. If it is the first time since opening QuickMAP that the user switches to tablet input mode, the sequence described below for 'Locate Tablet Menu' is initiated automatically. When control is transferred to the tablet, the mouse cursor and the Menu Bar disappear from the computer screen (both are inactivated). The status line moves to the top of the screen and remains active. When 'Draw Input Mode' is selected from the QuickMAP Digitizing Menu (the paper tablet menu), control is transferred from tablet to screen input mode. This is indicated by reappearance (and reactivation) of the mouse cursor and Menu Bar on the computer screen.

- **LOCATE TABLET MENU**

Position the paper QuickMap Digitizing Menu on the tablet; this must be done so the computer can "find" the menu and communicate properly with the tablet. This menu item is available only while in tablet input mode, and is automatically invoked at the end of a tablet registration if necessary. When 'Locate Tablet Menu' is selected, a dialog is displayed requesting the tablet menu width and height. The default values that are automatically entered are those

specified during installation using QMSetup or those specified while running the TABLOOK Utility. The first time within a QuickMAP session that 'Locate Tablet Menu' is invoked (either by the user or automatically by the tablet registration process), the response of '1. OK' or '2. Cancel' must be entered with the function keys, because both the mouse and tablet cursor are inactive. Next, another dialog is displayed which asks the user to successively digitize the points of arrows 1, 2, and 3. These arrow points are in the tiny white boxes at the lower left, upper right and lower right corners of the paper tablet menu. The computer should issue a double "beep" as each arrow is digitized. If there is a problem with the menu location, the computer will issue a single "beep" and the dialog on the computer screen will display a series of messages to guide the proper adjustment of the menu. When the tablet menu location is automatically invoked by a tablet registration, pressing cursor button two will cancel the location process.

- **SET WORLD**

Reset the window used for the 'World View'. A dialog is displayed stating which world view is currently in effect and offering 3 choices for defining the 'World View': '1. Mapfile's World' is the default value, and corresponds to the minimum bounding rectangle for the currently open mapfile; '2. Current Screen View' corresponds to whatever scaling is being used for the current display - this may be a 'Window View', 'Zoom View', etc. set by the user prior to selecting 'Set World'; and '3. Tablet Extents' corresponds to the entire digitizing surface of the tablet. Once 'Set World' is executed, it will stay in effect until changed by another 'Set World' or until DRAW is exited.

- **REGISTER TABLET**

Registration or fitting of a map to a particular coordinate system. This is necessary so QuickMAP can properly transform tablet coordinates into mapfile coordinates. When 'Tablet Registration' is selected, a series of dialogs and messages guides the user through a "software fitting" process. For more detail, see the section 'Tablet Registration in QuickMAP' in part 3 of this manual.

- **SHOW/HIDE COORDINATES**

This is a "toggle" button. Selecting it will alternately 'Show' or 'Hide', at the top left of the screen, the pair of XY coordinate values that corresponds to each point as it is digitized.

- **SHOW/HIDE TICKS**

This is a “toggle” button. Selecting it will alternately ‘Show’ or ‘Hide’ ticks on each point in an arc as it is digitized. Or, for an arc already on the screen, selecting ‘Show Ticks’ will redraw an unflagged arc with all points marked by ticks; ‘Hide Ticks’ will redraw the arc without ticks.

- **SHOW/HIDE DIRECTION**

This is a “toggle” button. Selecting it will alternately ‘Show’ or ‘Hide’ the directional arrow on the end of the arc or as points are digitized. The arrow indicates the direction in which the arc was digitized.

DRAW Menu

Arc	Modify	View	Information	Options	DRAW
Mapfile: MANATEE	Arc: UNTITLED	Length: 0	Buffer		DRAW Info ----- GALLERY ASSEMBLY DISPLAY

Moving the mouse cursor over 'DRAW' in the menu bar at the top of the screen in the DRAW module activates a dropdown menu from which the user may enter other QuickMAP program modules. A menu item is selected by clicking on its name in the dropdown menu on the computer display, or by digitizing on its name on the paper menu if in tablet

mode. The choices in the 'DRAW' menu include: 'DRAW Info', 'GALLERY', 'ASSEMBLY', and 'DISPLAY'. Descriptions of how the various program modules can be used are given in section 3 of this manual ('An Overview and Tour of QuickMAP's Operation').

- **DRAW INFO**

A dialog is displayed containing some useful information about maximum arc length in QuickMAP and how it is determined.

- **GALLERY**

Terminate DRAW and go to the GALLERY. If an arc that has not been saved is on the screen, an alert is displayed for the user to choose whether the arc should be abandoned or saved, or the GALLERY selection cancelled. '3. Cancel' is the default and may be selected by pressing <Enter>. If the buffer contains data when '1. Save' is selected, another dialog is displayed from which the user may choose to '1. Append' or '2. Abandon' the data in the buffer or to '3. Cancel' the selection.

- **ASSEMBLY**

Terminate DRAW and go to ASSEMBLY. If an arc that has not been saved is on the screen, an alert is displayed for the user to choose whether the arc should be abandoned or saved, or the ASSEMBLY selection cancelled. '3. Cancel' is the default and may be selected by

pressing <Enter>. If the buffer contains data when the '1. Save' is selected, another dialog is displayed from which the user may choose to '1. Append' or '2. Abandon' the data in the buffer or to '3. Cancel' the selection.

- **DISPLAY**

Terminate DRAW and go to DISPLAY. If an arc that has not been saved is on the screen, an alert is displayed for the user to choose whether the arc should be abandoned or saved, or the DISPLAY selection cancelled. '3. Cancel' is the default and may be selected by pressing <Enter>. If the buffer contains data when the '1. Save' is selected, another dialog is displayed from which the user may choose to '1. Append' or '2. Abandon' the data in the buffer or to '3. Cancel' the selection.

ASSEMBLY Menus

MapID Menu

MapID	Modify	View	Information	Options	ASSEMBLY
New	ITLED		Mapfile: MANATEE		Table Selected
Open . . .					
Delete . . .					
Save					
Save as . . .					
Abandon					
Output					
Quit					

Moving the mouse cursor over 'MapID' in the menu bar at the top of the screen in the ASSEMBLY module activates a dropdown menu from which the user may select operations affecting mapIDs. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'MapID' menu are 'New', 'Open', 'Delete', 'Save', 'Save as', 'Aban-

don', 'Output', and 'Quit'. Descriptions of how the individual menu items work are given below.

- **NEW**

Create an untitled mapID containing no arcs. The mapID table is cleared of any existing arcs/sets; status line is changed to reflect 'Current Id' name ('UNTITLED') with the entire 'Table selected'. Display parameters (scale, color, etc.) remain as previously set until changed by user.

- **OPEN...**

Open (load) an existing mapID or, if it does not exist, create it. A dialog is displayed and user must type at the keyboard the name of a mapID he wishes to access. If the user types in the name of a nonexistent mapID, or one not found in the currently open mapfile, he will be informed and given a chance to enter a new name or have a new mapID created under the name given. If the name of a valid mapID is typed in, the arcs/sets of that ID are listed in the mapID table and drawn on the display screen, and the status line is changed to reflect the name of the 'Current ID' with the 'Table Selected'. Scale, color, point symbol, etc are set to default values only if this is the first mapID opened. Otherwise, they remain as previously set until changed again by user.

- **DELETE...**

Delete the currently open mapID from the mapfile. An alert is displayed, asking user to confirm that the mapID should be deleted.

- **SAVE**

MapID is saved and given the name under which the current ID was opened or saved. No warning is given if the mapID has been altered. If the current ID is 'UNTITLED' (new), a dialog is displayed and user types in a name under which to save the ID.

- **SAVE AS...**

To be used for new, currently untitled mapIDs or when the user wants to save an edited ID under a new name. A dialog is displayed, asking the user to type in a name for the mapID.

- **ABANDON**

Used to abandon changes made to the currently open mapID, ie., to restore the ID to its original state. An alert is displayed giving the user the choice to 'Save' the changes, 'Abandon' them, or 'Cancel' the operation. Display parameters (scale, color, etc.) are not changed.

- **OUTPUT**

A special file compatible with the GEM Output utility is written on your disk in the current directory; it will allow hard copy production of the mapID display. A dialog is displayed and the user enters the filename under which to save the contents of the mapID list as a GEM file. The GEM Output utility, which can be entered from the QuickMAP Gallery, can use this file to reproduce the mapID display on any output device (eg, printer) for which GEM has been configured.

- **QUIT**

Exit QuickMAP, without passing through the GALLERY. The user first is alerted to any "unfinished business", such as a mapID that has been edited and not saved.

Modify Menu

MapID	Modify	View Information Options	ASSEMBLY
Current I	Insert Before Insert Close <hr/> Add Arcs . . . Add Sets . . . Merge ID . . . <hr/> Change Set Change Direction <hr/> Remove Arc Remove Set	apfile: MANATEE	Table Selected

Moving the mouse cursor over 'Modify' in the menu bar at the top of the screen in the ASSEMBLY module activates a dropdown menu. The user may then select menu items or commands to build and edit mapID lists. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'Modify' menu are 'Insert Before', 'Insert Close', 'Add Arcs', 'Add Sets', 'Merge ID', 'Change Set', 'Change

Direction', 'Remove Arc', and 'Remove Set'. Descriptions of how the individual menu items work are given below.

- **INSERT BEFORE**

Makes room for additional arcs/sets in the mapID table preceeding one selected by the user. An arc/set must be selected prior to 'Insert Before'; an alert will inform the user if none is selected. To select an arc/set, click on its name in the mapID table and a pointer will appear to the left of the name. The status line (at upper right corner) will indicate 'Arc/Set Selected'. When 'Insert Before' is selected, the name of the selected arc/set is shown in gray print at the bottom of the table, indicating that it and all the table entries following it are currently "inactive", and will be ignored in subsequent operations until the insert mode is closed (see INSERT CLOSE below). After the space in the table is opened, the user may ADD ARCS, ADD SETS, and perform various other editing tasks.

- **INSERT CLOSE**

Ends the insertion mode described in INSERT BEFORE. Closes the space in the mapID table, moving the "grey" (inactivated) part of the table to immediately follow your last addition to the list. The temporarily inactivated part of the mapID is now activated (reappears in black print on the display) and is included in all subsequent operations on the mapID.

- **ADD ARCS...**

Adds arcs to an existing mapID (either at the end of or inserted within the mapID table) or to a newly created mapID. If 'Add arcs' is selected with a new, empty mapID table displayed, an alert will appear, warning that the mapID table must begin with a set label and that an 'Outline' set label will be inserted. The user can select '1. OK' to have the table begin with an 'Outline' label or '2. Cancel' and start again by selecting 'Add Sets' or 'Open' ID to begin the ID table with a set label of his choice. When the table has been properly initiated, selecting 'Add Arcs' will display a dialog for the user to type in the arc name(s) desired. A single arc name or a sequence of names may be entered. The user may also select 'Normal' or 'Reversed' for arc direction; 'Normal' is the default. After typing the arc names and choosing direction, selecting the '1. More' button will process the arcs and a message will be displayed on the dialog prompting the user to 'Enter more arcs'. If '2. Done' is selected, the arcs will be processed and the dialog will disappear. All arcs entered while the 'Add Arcs' dialog was on the screen will be drawn in the display window.

- **ADD SETS...**

Adds sets to an existing mapID (either at the end of or inserted within the ID table) or to a newly created mapID. A dialog is displayed allowing the the user to specify a set's topology. Topology includes set type (outline, hole, line, or points), arc direction, and a list of arc names. Also, a choice is offered to make each arc a separate feature or to include all arcs in one feature. After completion of these entries, more sets may be immediately added to the same ID table by selecting '1. More' and using the same dialog again. When finished adding sets to the current mapID table, select '2. Done'. The ID table will be filled in to reflect the additions you have made, and the sets will be drawn if they are within the limits of the display window.

- **MERGE ID**

Merge the contents of two mapIDs. An ID should first be open in the mapID table. When 'Merge ID' is selected, a dialog is displayed for the user to enter the name of the ID to be combined with the currently open ID. When a valid ID name is entered, the mapID table is updated to include the names of the arcs in the merged ID. The display is redrawn to show all arcs in the combined IDs. The new mapID may then be saved under a new name (using 'Save as') or the name of the originally open ID may be used (by selecting 'Save'). The process may be repeated to merge as many IDs as desired.

- **CHANGE SET**

A set must first be selected by clicking on the set label in the mapID table. A dialog is displayed allowing the user to specify how its type should be defined (outline, hole, lines, points). The process is completed by selecting button '1. OK' to confirm the change or '2. Cancel.'

- **CHANGE DIRECTION**

An arc must first be selected by clicking on its name in the mapID table. A dialog is displayed for the user to confirm the change of direction of the selected arc and an arrow indicating the new direction will show on the display. The arrow indicating the original direction of the arc will also show until the display is cleared and redrawn. Arcs tagged with 'Reverse' in the ID table indicate that the order of a coordinate must be opposite its original digitized order. Reversing an arc twice will put it back to the direction in which it was originally digitized.

- **REMOVE ARC**

An arc must first be selected by clicking on its name in the mapID table. A dialog is displayed for the user to confirm or cancel the removal of the selected arc from the table. Although the arc name disappears from the ID table, the arc will not be removed from the display until the display is cleared and redrawn. The arc is not permanently removed from the mapID until the table is saved.

- **REMOVE SET**

A set must first be selected by clicking on the set label in the mapID table. A dialog is displayed for the user to choose: 1) to remove the set 'Label only' - this can be used, for example, to combine the arcs of several sets into one set by eliminating intervening set labels; 2) to remove the set 'with arcs' - the set label still appears in the table, but with '0 arcs', and if unused in subsequent editing, will be deleted when the mapID is saved or otherwise cleared; or 3) to cancel the operation. Even though all the arcs in a set are removed, the set itself is not actually removed until the table is saved.

View Menu

MapID	Modify	View	Information	Options	ASSEMBLY
Current ID: UNTI		World View Table View Window View Zoom View Shift View ----- Redraw Clear ----- Overlay Arc ... Overlay ID ...		MANATEE	Table Selected

Moving the mouse cursor over 'View' in the menu bar at the top of the screen in the ASSEMBLY module activates a dropdown menu. The user may then select menu items or commands to change the magnification and content of the view seen on the screen. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'View' menu are 'World View', 'Table View', 'Window View',

'Zoom View', 'Shift View', 'Redraw', 'Clear', 'Overlay Arc', and 'Overlay ID'. Descriptions of how the individual menu items work are given below.

- **WORLD VIEW**

Clears the display window and draws the arcs of the currently open mapID on the display screen so that the viewing area can contain all the arcs in the currently open mapfile, ie, window size is defined as the minimum bounding rectangle of the mapfile. 'World View' is the default display view. It is automatically selected each time you start QuickMAP. 'World View' stays in effect until the user selects one of the other view options on the 'View' menu.

- **TABLE VIEW**

Clears the display window and draws the arcs of the currently open mapID table on the display screen so that the window's size is defined by the maximum extents of the arcs listed in the mapID table. For example, use this when a particular mapID comprises an area so small compared to the "world" (as described in WORLD VIEW), that it is difficult to see. Once selected, 'Table View' will stay in effect until the user changes the view or quits ASSEMBLY.

- **WINDOW VIEW**

Clears the display window and draws the arcs of the currently open mapID table on the display screen with a window set by the user. When 'Window View' is selected, the status line will

display the message 'Identify opposite corners of a window view', and the mouse pointer will become a cross-hair cursor. Use this cursor to position one corner of a box defining the new view and then click the mouse button. Then move the cursor to the diagonally opposite corner of the box defining the new view and click again. The new window is outlined on the screen by a solid line and the user is asked to confirm that this is the view he desires by selecting button '1. Ok'. Button '2. Retry' resets the display so a different window may be defined or '3. Cancel' terminates the operation without changing the view. When a window is approved by the user, its contents will be expanded to cover the entire work area. Once selected, a 'Window View' will stay in effect until changed by the user, or until ASSEMBLY is exited.

- **ZOOM VIEW**

Clears the display window and draws the arcs of the currently open mapID table on the display screen, to a multiple or fraction of the existing scale, and centered at a point selected by the user. When 'Zoom View' is selected, the status line displays the message 'Identify center of zoom view'. User clicks the mouse cursor at the desired spot. Whatever spot is marked becomes the center of a "zoom lens" and is indicated by two lines intersecting on the display. A dialog is then displayed for the user to type in a magnification factor. Numbers smaller than 1 result in a display smaller than the existing one (zoom out); numbers larger than 1 result in a magnified display (zoom in). For example, entering "0.5" will redraw the mapID display at 1/2 the existing size; entering "5" will redraw the display at 5 times the current size. Once selected, a 'Zoom View' will stay in effect until changed by the user, or until the user quits ASSEMBLY.

- **SHIFT VIEW**

Clears the display window and draws the arcs of the currently open mapID table on the display screen, shifted in a direction specified by the user. First the status line displays the message 'Identify corner of shifted view'. Whatever point is marked by the user (by clicking the mouse cursor) becomes the intersection of two lines that divide the window into four quadrants. The status line then displays the message 'Identify quadrant of shifted view' and six control buttons appear near the bottom of the work area. By selecting one of the buttons numbered 1 through 4, the user may select which quadrant of the four he wishes to be displayed in the new view. Button '5. Retry' allows the user to mark another point to redefine the quadrants or '6. Cancel' terminates the operation without changing the display. Once selected, a 'Shift View' will stay in effect until changed by the user, or until the user quits ASSEMBLY.

- **REDRAW**

Draws the arcs currently selected in the mapID table, using the display parameters (view, point symbol, color, etc.) that have been set for the table. All the arcs will be drawn if the table is selected, ie, if no individual arc names or set labels are selected. The display is not cleared prior to the redraw, so only items newly added to the table will be obviously added to the display. An arc or set of arcs may be selected by clicking on its name in the table or by using 'Pick arc/set' ('Options' menu); the name is then marked by a pointer to the left of the name.

- **CLEAR**

Clears the display window.

- **OVERLAY ARC...**

Draws an arc selected by the user without first clearing the display window. A dialog is displayed for the user to type in the name of an arc. The arc is then drawn superimposed on the current display. When the display is cleared and redrawn by a change of view, overlaid arcs are eliminated - only arcs currently selected in the ID table are redrawn. Also, overlaid arcs are not affected by the 'Arc Names on' or 'Pick arc/set' commands ('Options' menu). Prior to using 'Overlay Arc', the user may set a color, point symbol, and/or line style to highlight the information. See 'Color', 'Line Style' and 'Point Symbol' selections in the 'Options' menu.

- **OVERLAY ID...**

Draws a mapID selected by the user without first clearing the display window. A dialog is displayed for the user to type in the name of the desired mapID, which is then drawn superimposed on the current display. When the display is cleared and redrawn by a change of view, overlaid IDs are eliminated and not redrawn. As with 'Overlay Arc', the user can highlight the overlaid ID by setting the 'Color', 'Point Symbol' and/or 'Line Style' in the 'Options' menu. This must be done prior to selecting 'Overlay ID'.

Information Menu

MapID	Modify	View	Information	Options	ASSEMBLY
Current ID: UNTITLED			Help		Table Selected
			List Arcs		
			List Arcs in Family. . .		
			List Families		
			List IDs		
			List IDs with Arc		

Moving the mouse cursor over 'Information' in the menu bar at the top of the screen in the ASSEMBLY module activates a dropdown menu from which the user may make selections that provide information about mapIDs their component arcs and families. QuickMAP's on-line help is also activated from this menu. A menu item is selected by

clicking on its name in the dropdown menu. The choices in the 'Information' menu are 'Help', 'Table Information', 'List Arcs', 'List Arcs in Family', 'List Families', 'List IDs', and 'List IDs with Arc'. Descriptions of how the individual menu items work are given below.

- **HELP**

Activates QuickMAP's on line help. A special help screen displays 'Help' information and listings of items for which help is available. A description of any ASSEMBLY menu item is obtained by clicking on the item name in the dropdown menu while in 'Help' mode. Additional items for which help is available include cross references to related menu entries and operations as well as a glossary of mapping terminology

- **LIST ARCS**

All arcs in the currently open mapfile are listed in alphabetical order. If more than one "page" or display screen is required for the list, the program pauses after each page and the user can choose to 'Page Up', 'Page Down', or 'Cancel'.

- **LIST ARCS IN FAMILY...**

All arcs in a family of the user's choice are listed on the screen in numerical order. A dialog is displayed for the user to type in the desired family name. The family must belong to the currently open mapfile. All arcs belonging to that family are then listed. For example, typing

the family name "Spring" would result in a list such as "Spring1, Spring2,...SpringN". As with 'List All Arcs', if the listing requires more than one page, the user may move backward and forward in the list by selecting buttons at the bottom of the screen.

- **LIST FAMILIES**

All families in the currently open mapfile are listed alphabetically on the screen. The options of paging up or down through extended lists is available.

- **LIST IDS**

All mapIDs in the currently open mapfile are listed alphabetically on the display. Paging up and down through extended lists is available.

- **LIST IDS WITH ARC**

A dialog is displayed for the user to enter the name of an arc in the currently open mapfile. When a valid arc name is entered, all mapIDs that contain the chosen arc are listed alphabetically on the display. Paging up and down through extended lists is available.

Options Menu

MapID	Modify	View	Information	Options	ASSEMBLY
Current ID: UNTITLED		Mapfile:		Pick arc/set Color Line Style Point Symbol Arc Names on	Table Selected

Moving the mouse cursor over 'Options' in the menu bar at the top of the screen in the ASSEMBLY module activates a dropdown menu. The user may then select menu items or commands to change the display parameters and to identify and highlight a specific arc or set on the screen. A menu item is selected by clicking on its name in the dropdown

menu. The choices in the 'Options' menu are 'Pick Arc/Set', 'Color', 'Line Style', 'Point Symbol' and 'Arc Names on'. Descriptions of how the individual menu items work are given below.

- **PICK ARC/SET**

Identifies an arc/set on the display and selects it in the mapID table. When 'Pick arc/set' is selected, the status line displays the message 'Identify arc desired'. The user clicks within, on, or near an outline, line or point on the display. A dialog appears with the name of the "picked" arc already entered. At the same time, the arc named on the dialog is highlighted on the display by outlining (for polygons) or drawing (for lines, points) in red. (Unless the line color has already been reset to red by the user. In that case, the highlighting color will be green.) The arc "picked" by QuickMAP may be one of many found near the point where the user clicked, if there are more than one in close proximity. The dialog offers the following options. Choosing button '1. Select arc' causes the arc indicated on the dialog and in the display to be selected in the mapID table. Clicking on '2. Select set', causes the entire set that contains the "picked" arc to be selected in the mapID table. Choosing button '3. Try again', causes QuickMAP to enter another arc name from its list of "nearby" arcs and highlight the corresponding arc on the display. This 'Try again' procedure may be repeated until QuickMAP exhausts its list of arcs found near the user's selected area. Button '4. Cancel' terminates the process.

- **COLOR**

Sets the color for displaying arcs and mapIDs. A dialog is displayed showing the colors available (up to fourteen plus black and white). The user changes the setting by clicking on any of the color bars. A pointer appears next to the current color. Once a color change is made, it will remain in effect until changed again by the user. The default color for arcs listed on the mapID table is black. For overlays, the default is black for individual arcs and red for arcs that are part of an ID.

- **LINE STYLE**

Sets the line style for displaying arcs and mapIDs. A dialog is displayed showing the eight line styles available. The user changes the setting by clicking on any of the line style bars. A pointer appears next to the current line style. Once a pattern change is made, it will remain in effect until changed again by the user. The default mapID table and overlay line style is a solid line of normal width.

- **POINT SYMBOL**

Sets the symbol for displaying point data. A dialog is displayed showing the six symbols available: dot, plus, asterisk, square, diagonal cross, and diamond. The user changes the setting by clicking to the left of the desired symbol. Once a point symbol is selected, it will remain in effect until changed again by the user. The default symbol for point data listed in the mapID table is a black plus; for overlaid point data, the default is a plus for individual arcs and a diagonal cross for arcs that are part of an ID.

- **ARC NAMES ON/OFF**

Labels the arcs listed on the MapID Table that are shown in the workarea. This menu item is a toggle; ie., clicking on it alternately selects 'Arc Names on' and 'Arc Names off'. 'Arc Names on' must be selected prior to drawing a view on the screen. If it is selected after arcs are already drawn, no labels are added until the display is redrawn. Similarly, if 'Arc Names off' is selected when arcs are already labelled on the screen, the display must be cleared and redrawn to eliminate the labels. Overlaid arcs or IDs are not labelled.

ASSEMBLY Menu

MapID	Modify	View	Information	Options	ASSEMBLY
Current ID: UNTITLED		Mapfile: MANATEE			ASSEMBLY Info

					DRAW
					GALLERY
					DISPLAY

Moving the mouse cursor over 'ASSEMBLY' in the menu bar at the top of the screen in the ASSEMBLY module activates a dropdown menu from which the user may enter other QuickMAP program modules. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'ASSEMBLY' menu include 'ASSEMBLY Info', 'DRAW', 'GALLERY', and 'DISPLAY'. Descriptions of

how the various program modules can be used are given in section 3 of this manual ('An Overview and Tour of QuickMAP's Operation').

- **ASSEMBLY INFO**

A dialog is displayed that gives the names of the authors of the ASSEMBLY module and the available free memory in bytes.

- **DRAW**

Terminate ASSEMBLY and go to the DRAW module. The user is first alerted to prevent loss of work that has not been saved.

- **GALLERY**

Terminate ASSEMBLY and go to the GALLERY. The user is first alerted to prevent loss of work that has not been saved.

- **DISPLAY**

Terminate ASSEMBLY and go to the DISPLAY module. The user is first alerted to prevent loss of work that has not been saved.

DISPLAY Menus

Map Menu

Map	Modify	View	Information	Calculate	Options	DISPLAY
New	Map List: UNNAMED					Mapfile: MANATEE
Open. . .						
Save. . .						
Save as. . .						

Abandon						
Output						
Quit						

Moving the mouse cursor over 'Map' in the menu bar at the top of the screen in the DISPLAY module activates a dropdown menu from which the user may select operations affecting Map Lists, or '.QMM' files. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'Map' menu are 'New', 'Open', 'Save', 'Save as', 'Abandon', 'Output', and 'Quit'. De-

scriptions of how the individual menu items work are given below.

- **NEW**

Clear the Map List. All mapID names currently on the Map List are deleted and the display is cleared. The status line changes to show 'Map List: UNNAMED'. All display parameters, except the view (scale factor), are reset to default values.

- **OPEN...**

Open a previously saved Map List. A dialog is displayed for the user to enter the name of a valid Map List file (a .QMM file; see 'Save'). A message is displayed on the dialog if an invalid name is entered or if the mapfile name in the .QMM file does not match the mapfile currently open. When a valid name is entered, the mapID names contained in the file are listed on the display 'Map List'. The highlight bar moves to the last entry in the list, and the 'CURRENT' display parameters in the bottom panel reflect the bar position. The status line is changed to show the newly opened map list name. The IDs in the 'Map List' are not drawn on the display until the user selects a command to draw from the 'View' menu.

- **SAVE**

Save the contents of a Map List in a .QMM file (see below). If a previously saved Map List is currently open, its name will be displayed on the status line. Clicking on 'SAVE' in this case will save the Map List information under the name of that previously opened file. No warning is given before the previously saved file is overwritten. This feature may be used to re-save a Map List after editing. If no Map List is currently open, the status line displays 'Map List: UNNAMED'. Clicking on 'SAVE' in this case is similar to using 'SAVE AS'. A dialog is displayed for the user to enter a new file name. The name chosen can be any valid DOS file name, and will be stored as "filename.QMM" on the current directory. A message is displayed on the dialog if the name entered is invalid. Clicking on '1. OK' (or pressing < Enter>) after typing in a new, valid name saves the Map List and terminates the dialog. If the name chosen duplicates that of an already existing file, a message is displayed on the dialog warning that the previously existing file will be overwritten if '1. OK' is selected. To prevent this, the editing keys may be used to enter a new name for the file. Or selecting button '2. Cancel' will clear the dialog without saving the mapfile.

Selecting 'SAVE' when the Map List is empty displays an alert informing the user that empty Map Lists cannot be saved.

A .QMM file contains the mapfile name, mapID and/or Group names from the current 'Map List', and information identifying the display parameters for each. The display parameters stored will be those currently selected for each ID or Group. Parameters will be stored only if they are different from the default values. You may review the display parameters currently selected for an ID or its Group by clicking on the ID name in the 'Map List'. The selected name will be highlighted by a reverse video bar and its display parameters will be summarized graphically under 'CURRENT' in the bottom panel of the display screen. More information on the .QMM file is given in the section entitled 'Data Structures Used by QuickMAP' in chapter 2 of this manual.

- **SAVE AS ...**

Save a Map List under a new file name. A dialog is displayed for the user to enter a name for the mapID and/or Group information contained in the current 'Map List'. The name chosen can be any valid DOS file name, and will be stored as "filename.QMM" on the current directory. A message is displayed on the dialog if the name entered is invalid. Clicking on '1. OK' (or pressing < Enter>) after typing in a new, valid name saves the Map List and terminates the dialog. If the name chosen duplicates that of an already existing file, an alert is displayed and the user is asked to confirm overwriting the existing file. Choosing '1. OK'

will overwrite the file and '2. Cancel' will clear the dialog without saving the Map List. Or the editing keys may be used to enter a new filename.

The .QMM file will contain the mapfile name, mapID and/or Group names from the current 'Map List', and information identifying the display parameters for each. The display parameters stored will be those currently selected for each ID or Group. Parameters will be stored only if they are different from the default values. You may review the display parameters currently selected for an ID or its Group by clicking on the ID name in the 'Map List'. The selected name will be highlighted by the inverse video bar and its display parameters will be summarized under 'CURRENT' in the bottom panel of the display screen. More information on the .QMM file is given in the section entitled 'Data Structures Used by QuickMAP' in chapter 2 of this manual.

- **ABANDON**

Abandon changes made to the 'Map List' and restore the list to its previous state. If the 'Map List' has been edited (using 'Delete', 'Add', or 'Insert' from the 'Modify' menu), selecting 'Abandon' displays an alert offering three choices. If '1. Save' is selected, the edited list is saved under the 'Map List' name currently shown on the status line. Selecting '2. Abandon' will clear all 'Modify' changes made to the map list since the last 'Open' was executed, thus restoring the list to its original, unedited state. '3. Cancel' terminates the 'Abandon' and leaves the map list in its edited state but does not save it. Selecting 'Abandon' has no effect if no 'Modify' changes have been made to the map list since the last 'Open'. Note: 'Modify' changes do not include changing display parameters.

- **OUTPUT**

A special file compatible with the GEM output utility is written to disk to allow hard copy production of the current display. A scale for this output may be specified by the user.

When 'Output' is selected, the SAVE GEM FILE dialog appears. The user may enter a file name for the output file. Any valid DOS file name is acceptable; the .GEM extension is provided automatically. Toggle buttons allow selection of 'Printer' or 'Screen' for output device and 'Landscape' or 'Portrait' for page orientation. An output file written for 'Printer' allows higher resolution than one written for 'Screen'. When all information is complete, clicking on button '1. OK' or pressing <Enter> continues to the next dialog. Clicking on '2.Cancel' terminates the process.

The second dialog allows the user to DEFINE OUTPUT SIZE. Two buttons at the top of the dialog, 'SCALE' and 'PAGE SIZE' show the two modes by which scaling may be specified.

If the SCALE mode button is selected, a map scale is calculated using the data in the work area and a page size of 7.5 by 10 inches (standard 8.5 by 11 with 1/2 inch margins on all sides). It is displayed on the 'Map scale' line with a text cursor. This scale value may be edited using the standard QuickMAP editing keys or may be accepted as is. Pressing <Enter> then calculates and displays a page size that corresponds to the map scale. The scale entered must be large enough so that the corresponding page size is no larger than 32 by 32 inches. The map scale may be re-edited as many times as desired to check the corresponding page size. When the scale factor and page size combination is acceptable, click on '3. Done' to clear the dialog and save the output file. Or button '4. Cancel' ends the process without writing a file.

If PAGE SIZE mode is selected (by clicking on that button at the top of the DEFINE OUTPUT SIZE dialog), the dialog changes to display 'Height' and 'Width' fields below the buttons, with default values of 7.5 x 10 inches. The user may define the PAGE SIZE by entering a new Height and Width, or may accept the defaults. Pressing <Enter> toggles between the Height and Width fields for editing. Or when both fields have been appropriately filled in and the cursor is positioned in the Width field, pressing <Enter> calculates and displays a scale factor corresponding to the page size. A maximum value of 32 inches is allowed for Height and/or Width. These values may be edited as often as desired. When the combination of page size and scale factor are acceptable, clicking on button '3. Done' when the cursor is in the Width field will write the output file to disk. Button '4. Cancel' ends the process without saving a file.

The output file may be printed or viewed on the screen from the GEM output utility, which may be accessed by selecting 'Output' from the 'File' menu in QuickMAP's GALLERY. The map scale value will appear near the upper left corner of the output, in the form 1:XXXXXXXXXXXX.

- **QUIT**

Exit QuickMAP, without passing through the GALLERY. The user is first alerted to unfinished business such as an edited but unsaved 'Map List'. He may choose to '1. Save', or '2. Abandon' the Map List before leaving QuickMAP, or to '3. Cancel' the 'Quit' command and remain in DISPLAY.

Modify Menu

Map	Modify	View	Information	Calculate	Options	DISPLAY
Group	Add/Replace ID Insert ID ----- Delete ID/Group Move ID/Group ----- Make Group. . . Clear Group. . . Show Group. . .		Map List: UNNAMED			Mapfile: MANATEE

Moving the mouse cursor over 'Modify' in the menu bar at the top of the screen in the DISPLAY module activates a dropdown menu. The user may then select menu items or commands to modify or edit Map Lists, making changes to the MapIDs listed. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'Modify' menu are 'Add/Replace ID', 'Insert ID', 'Delete ID/Group', 'Make Group', 'Clear Group', and 'Show Group'. Descriptions of how the individual

menu items work are given below.

- **ADD/REPLACE ID**

Add a mapID to the 'Map List' on the line currently occupied by the highlight bar. A dialog is displayed for the user to enter the name of a mapID. An informative message appears on the dialog if an invalid ID name is entered or if the ID cannot be found in the currently open mapfile. If the reverse video or "highlight" bar occupies a blank line on the 'Map List' when the name is entered, the ID name will be entered on that line and the highlight bar will move down to the next line on the list. If the user selects a name on the 'Map List' by clicking on the name, the bar will move to highlight the selected name. Then, if another name is added while the bar is highlighting the selected name on the 'Map List', the highlighted name will be deleted and replaced by the new addition. After a valid name is entered on the dialog, the user may select button: '1. Done', to complete the process of adding names to the 'Map List' after which the highlight bar will remain on the last entry made to the list; '2. More', to repeat the process allowing another name to be added to the list; or '3. Cancel', to terminate the process without adding the ID name currently on the dialog. Button '2. More' is the default, automatically selected by pressing <Enter>. Although it is possible to move the highlight bar to any position in the Map List, do not move the bar in such a way that blank lines are inserted between entries.

- **INSERT ID**

Insert a mapID name into the 'Map List' at a position indicated by the user. The user may select a position by clicking on an ID name in the list; the name will be highlighted by a reverse video bar. When 'Insert ID' is selected from the menu, a space will be opened in the 'Map List' above the highlighted entry (ie, the reverse video bar will stay on the line to be occupied by the inserted mapID name and the rest of the names on the list will move down one line). Next, a dialog is displayed for the user to enter the name of a mapID. An informative message appears on the dialog if an invalid ID name is entered or if the ID cannot be found in the currently open mapfile. After a valid ID name is entered, the user may select button: '1. Done', to complete the process of inserting ID names into the 'Map List'; '2. More', to repeat the process allowing entry of another name below the one just inserted; or '3. Cancel', to terminate the process of inserting names into the 'Map List' without inserting the ID name currently on the dialog. Button '2. More' is the default, automatically selected by pressing <Enter>. Although it is possible to move the highlight bar to any position in the Map List, do not move the bar in such a way that blank lines are inserted between entries.

- **DELETE ID/GROUP**

Delete from the 'Map List' a mapID or Group name selected by the user. To delete a mapID, the user first selects the mapID from the current Map List by clicking on the name. The reverse video or "highlight" bar will move to highlight the selected name. To delete a Group, the names in the Group must first be checked using 'Show Group.' After the ID or Group is appropriately marked, 'Delete ID/Group' is selected from the menu. The ID name or Group names will be removed from the list and the remaining names will be moved up to fill any blank spaces left by the deletion. The deletion from the Map List will not be reflected in the display until a 'Clear' and 'Redraw' are performed (see 'Clear' and 'Redraw' under 'View Menu' below).

- **MOVE ID/GROUP**

*****CURRENTLY INACTIVE*****

- **MAKE GROUP**

Associate mapIDs selected by the user into a 'Group.' Association into a 'Group' denotes IDs that share the same display attributes. A dialog is displayed for the user to enter a Group name. An informative message appears on the dialog if an invalid name is entered. After a valid Group name is entered, select '1. Select ID (or press <Enter>)' and the message 'Select IDs for group' will appear on the dialog. Select the IDs to be included in the Group by clicking

on their names in the Map List. All selected names will be highlighted by the reverse video bar. When finished selecting names for the Group, click on '2. OK.' The reverse video bars will disappear and the Group names will be checked. The status line will change to reflect the new Group name and the last ID selected for the Group will remain selected in the Map List (highlighted by the reverse video bar). Thereafter, whenever an ID is selected by clicking on its name in the Map List, the status line will change to reflect the name of the Group (if any) to which that ID belongs. A Group's attributes are those of the ID selected (highlighted by the reverse video bar) when 'Make Group' is chosen from the menu.

- **CLEAR GROUP**

Unmark (remove checks from) the Group that is currently checked on the Map List. When 'Show Group' has been used to indicate a Group of the user's choice, the names of IDs belonging to that Group are "checked" on the Map List. Selecting 'Clear Group' removes the checks from the Group ID names. The actual Group structure is not affected, and is still represented in the .QMM file.

- **SHOW GROUP**

Show which mapIDs on the Map List belong to a Group specified by the user. A dialog is displayed for the user to enter the name of a previously defined Group. If a valid Group name is entered and the user presses <Enter> or clicks on '1. OK,' those IDs on the Map List that belong to the Group will be checked .

View Menu

Map	Modify	View	Information	Calculate	Options	DISPLAY
Group: UNTITL		World View	Map List: UNNAMED			Mapfile: MANATEE
		Window View				
		Zoom View				
		Shift View				

		Save View				
		Load View				

		Clear				
		Redraw				

Moving the mouse cursor over 'View' in the menu bar at the top of the screen in the DISPLAY module activates a dropdown menu. The user may then select menu items or commands that change the magnification and content of the view on the screen. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'View' menu are 'World

View', 'Window View', 'Zoom View', 'Shift View', 'Save View', 'Load View', 'Clear', and 'Redraw'. Descriptions of how the individual menu items work are given below.

- **WORLD VIEW**

Clears the display window and draws the arcs of the mapIDs currently in the 'Map List' with the window defined by the current 'World View' as selected in 'Set World' (see 'Set World' under 'Options' menu). The default value for 'World View', and the one in effect if no 'Set World' has been executed, is a minimum bounding rectangle that can contain the extents of all arcs in the currently open mapfile. 'World View' stays in effect until the user selects one of the other view options on the 'View' menu or until DISPLAY is exited.

- **WINDOW VIEW**

Clears the display window and draws the arcs of the mapIDs currently in the 'Map List' with a window set by the user. When 'Window View' is selected, the status line will display the message 'Identify opposite corners of a window view', and the mouse pointer will become a cross-hair cursor. Use this cursor to position one corner of a box defining the new view and then click the mouse button. Then move the cursor to the diagonally opposite corner of the box defining the new view and click again. The new window is outlined on the screen by a solid line and the user is asked to confirm that this is the view he desires by selecting button '1. OK'. Alternately, he may select '2. Retry' to define a different window or '3. Cancel' to terminate the operation without changing the view. When a window is approved, its contents

will be expanded to cover the entire work area . Once selected, a 'Window View' will stay in effect until changed by the user, or until DISPLAY is exited.

- **ZOOM VIEW**

Clears the display window and draws the IDs currently in the 'Map List', to a multiple or fraction of the existing scale and centered at a point selected by the user. When 'Zoom View' is selected, the status line displays the message 'Identify center of zoom view'. The user clicks with the mouse cursor at the desired spot. Whatever spot is marked becomes the center of a "zoom lens" and is indicated by two lines intersecting on the display. A dialog is then displayed for the user to enter a magnification factor. Numbers smaller than 1 result in a display smaller than the existing one (zoom out); numbers larger than 1 result in a magnified display (zoom in). For example, entering "0.5" will redraw the display at 1/2 the existing size; entering "5" will redraw the display at 5 times the current size. Once completed, a 'Zoom View' will stay in effect until changed by the user, or until DISPLAY is exited.

- **SHIFT VIEW**

Clears the display window and draws the mapIDs currently in the 'Map List', shifted in a direction specified by the user. First the status line displays the message 'Identify corner of shifted view'. Whatever point is marked by the user (with the mouse cursor) becomes the intersection of two lines that divide the screen into four quadrants. The status line then displays the message 'Identify quadrant of shifted view'. Control buttons are displayed near the bottom of the work area and the user may: click on one of buttons 1 through 4 to select the corresponding quadrant as the one to be centered on the redrawn display; select button '5. Retry' and mark another point to redefine the quadrants; or select '6. Cancel' to terminate the operation without changing the display. Once completed, the shifted view will stay in effect until changed by the user, or until DISPLAY is exited.

- **SAVE VIEW**

Saves the contents of the display workarea as a bit image, using the magnification and display parameters (symbols, colors, patterns, etc.) currently shown on the screen. When 'Save View' is selected, a dialog is displayed for the user to enter the name of a file in which to save the display contents. The file name can be any name acceptable to DOS. The file is automatically given the extension .BK?, where ? is E, V, C, or H, corresponding to the EGA, VGA, CGA or Hercules graphics adapter installed with QuickMAP. The background file is saved on the current mapfile directory. The .BK? file can later be used to quickly recall a "background" display to the screen. (See 'Load View'.)

- **LOAD VIEW**

Loads, or displays on the screen, the contents of a .BK? file previously saved using the 'Save View' option. Only files with an extension (.BKE, .BKV, .BKC, or .BKH) compatible with the graphics adapter currently installed for QuickMAP may be loaded. The magnification and other display parameters (colors, patterns, symbols, etc.) will be those that were displayed on the screen when the view was saved. When 'Load View' is selected, a dialog is displayed for the user to enter the name of a .BK? file containing the view information desired. The file must be located on the current mapfile directory. A valid file name is entered and the user clicks on '1. OK' (or presses <Enter>). The image represented in the .BK? file is drawn on the display screen, but the information is not added to the Map List. A view that has been loaded may be modified and saved again, under the same or a different name. Loading a view also has the same effect as selecting 'Set World' and choosing 'Current screen view'; the display window is reset to correspond to the extents of the view when it was saved. The new extents will stay in effect until the user changes them with another 'Load View' or 'Set World' or until DISPLAY is exited. Views saved and re-displayed this way are especially convenient when a particular display is used repeatedly as, for example, a constant background for varying data sets. The display parameters selected for a particular 'Map List' are not saved or altered by saving or loading a "View". If a permanent record of these parameters is desired, the 'Map List' must be saved as a .QMM file (see 'Save' in the 'Map' menu).

- **CLEAR**

Clears the work area.

- **REDRAW**

Draws the display using the parameters (mode, color, shade pattern, line type, point type, and view) currently selected for each mapID in the 'Map List'. The screen is not automatically cleared of the existing display before being redrawn; any desired screen clearing must be done by selecting 'Clear' prior to 'Redraw'.

Information Menu

Map	Modify	View	Information	Calculate	Options	DISPLAY
Group: UNTITLED			Help	: UNNAMED		Mapfile: MANATEE
			List IDs			
			List Views			
			List Groups			
			List Map Lists			

Moving the mouse cursor over 'Information' in the menu bar at the top of the screen in the DISPLAY module activates a dropdown menu from which the user may make selections that provide information about MapIDs and their association into Map Lists. QuickMAP's on-line help is also activated from this menu. A menu item is selected by clicking on its name in the dropdown menu.

The choices in the 'Information' menu are 'Help', 'List IDs', 'List Groups', 'List Views', and 'List Map Lists'. Descriptions of how the individual menu items work are given below.

- **HELP**

Activates QuickMAP's on line help. A special help screen displays 'Help' information and listings of items for which help is available. A description of any DISPLAY menu item is obtained by clicking on the item name in the dropdown menu while in 'Help' mode. Additional items for which help is available include cross references to related menu entries and operations as well as a glossary of mapping terminology.

- **LIST IDS**

All mapIDs in the currently open mapfile are listed alphabetically on the display. Buttons may be selected to page up and down through lists covering more than one page.

- **LIST VIEWS**

"Background views" previously saved as .BK? files on the current map directory are listed alphabetically on the screen. Only those .BK? files compatible with the graphics adapter currently installed for QuickMAP (.BKE or .BKV or .BKC or .BKH) will be listed. Buttons may be selected on the dialog to page up and down through lists that are longer than one page.

See 'LOAD VIEW' and 'SAVE VIEW', under the 'View' menu descriptions, for more information on .BK? files.

- **LIST MAP LISTS**

All Map Lists (.QMM files) on the current directory are listed alphabetically on the display. Buttons may be selected to page up and down through lists covering more than one page. The .QMM files listed are not restricted to those from the currently open mapfile, but will include all map list files on the directory. If an attempt is made to 'Open' a .QMM file shown on the listing but not belonging to the currently open mapfile, a message is issued stating that the Map List file is incompatible.

Calculate Menu

Map	Modify	View	Information	Calculate	Options	DISPLAY
Group: UNTITLED			Map L	Area Perimeter Distance	ED	Mapfile: MANATEE

Moving the mouse cursor over 'Calculate' in the menu bar at the top of the screen in the DISPLAY module activates a drop-down menu. The user may then select menu items or commands to perform simple calculations on polygons and point data. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'Calculate' menu are 'Area,' 'Perimeter,' and 'Distance.' Descriptions of how the individ-

ual selections work are given below.

- **AREA**

Calculate polygon areas. An AREA CALCULATION dialog is displayed requesting entry of a mapID name. If a mapID was highlighted in the 'Map List' prior to selecting 'Area', that name will be entered automatically in the dialog, but may be edited by the user (using backspace, arrow, escape keys, etc.). Any ID name in the currently open mapfile can be entered. Control buttons offer choices '1. Polygon', '2. Total', or '3. Cancel'. If '1. Polygon' is selected, the dialog disappears and the Status Line displays the message 'Select desired polygon'. The user clicks within or near the polygon on the display for which an area calculation is desired. The selected polygon is outlined in a color complementary to that in which it is displayed and a dialog appears to report the polygon area (in selected units). This dialog offers control buttons '1. Another area' and '2. OK'. If the outline of another polygon overlaps the area in which the user clicked to identify the original polygon, selecting '1. Another area' will calculate its area. Otherwise, the user will be informed that no such overlapping polygon exists. Selecting '2. OK' terminates the area calculation process.

If '2. Total' (the default) is selected in the AREA CALCULATION dialog, the total area for all polygons in the mapID is calculated. If a mapID containing only line or point data, and no outlines, has been selected, an alert will inform the user that the set type has no area. 'Area' must then be re-selected from the 'Calculate' menu to enter another mapID name. If the selected mapID has an area, a dialog will report it and also offer the choices '1. Another area'

and '2. OK'. Selecting '1. Another area' will allow entry of another mapID name for area calculation; '2. OK' terminates the area calculation process.

- **PERIMETER**

Calculate polygon perimeters. A dialog is displayed for entry of a mapID name. If a mapID was highlighted in the 'Map List' prior to selecting 'Perimeter', that name is automatically entered in the dialog, but may be edited by the user. The name of any ID in the currently open mapfile may be entered. The dialog also offers control buttons '1. Polygon', '2. Total', and '3. Cancel'.

If '1. Polygon' is selected, the Status Line displays the message 'Select desired polygon', and the user clicks within or near the polygon for which a perimeter calculation is desired. The polygon is then outlined in a color complementary to the one in which it was originally displayed. (If the complementary color matches the background screen color, the polygon may seem to disappear.) A dialog is displayed to report the perimeter measurement (in kilometers) and offer control button choices '1. Another perimeter' and '2. OK'. Choosing '1. Another perimeter' will find the perimeter measurement of another polygon if its outline contains the same point used to select the first polygon. Otherwise, an alert will inform the user that no such overlapping polygons exist. Choosing '2. OK' terminates the perimeter calculation process.

If '2. Total' (the default) is selected in the first dialog, the sum of all perimeter lengths in the mapID is calculated. If the selected mapID contains only line or point data, but no outlines, an alert informs the user that the set type selected has no perimeter. Otherwise a dialog is displayed to report the total perimeter calculation and offer the choices '1. Another perimeter' and '2. OK'. Selecting '1. Another perimeter' returns to the PERIMETER CALCULATION dialog so the process may be repeated with another mapID. '2. OK' terminates the perimeter calculation process.

- **DISTANCE**

Calculate distance between two points selected by the user. A dialog is displayed for entry of a mapID name. If a mapID was highlighted in the 'Map List' prior to selecting 'Distance', that name is automatically entered in the dialog, but can be edited or re-typed by the user. The name of any mapID in the currently open mapfile may be entered. There are four control buttons on the dialog:

a) When '1. Airline' is selected, the dialog disappears and the Status Line displays the message 'Identify start and end points'. The user clicks at two points on the display and a dotted line is drawn between them. The two points can be anywhere on the display; it is not even necessary to have entered a mapID name or to have a mapID on the display. A dialog is displayed to report the distance (in user selected units) along the line between the two points and to offer choices '1. Another distance' and '2. OK'. Selecting '1. Another distance' allows the distance calculation process to be repeated; '2. OK' terminates it.

b) If, in the first dialog, '2. Along Line' is selected, a valid mapID name must have been entered on the Map List or may be entered on the dialog. (It will obviously be easier to mark a line for measurement if an ID was previously entered and drawn on the display.) The Status Line displays the message 'Identify two points on a line'. The user clicks at two points that approximate the line of measurement he wants. The two original data points that are closest to the points marked by the user are found. Then the distance between the two data points (along the originally digitized line) is calculated. The line used for the calculation is redrawn in a color complementary to the color choice currently in effect. A dialog is displayed to report the calculated distance (in user selected units), and to offer choices '1. Another distance', '2. OK', or '3. Complement'. Selecting '1' repeats the entire 'Along Line' process, and '2' terminates it. '3' will calculate and report the complement, ie., the remainder of the perimeter from which the first line was selected.

c) If '3. To Edge' is selected in the first dialog, a valid mapID name must have been entered on the Map List or may be entered on the dialog. (It is preferable to have entered an ID name on the Map List and drawn it on the display.) The Status Line displays the message 'Identify point'. The user clicks at a point anywhere on the display. The distance between that point and the closest edge of a polygon or hole in the selected mapID is calculated. A dialog is displayed to report the calculated distance (in user selected units). Control button choices offered are: '1. Another distance', which repeats the 'To Edge' process; and '2. OK', which terminates it. '3. Complement' does not exist in the 'To Edge' context and is permanently disabled.

d) The final control button in the first dialog is '4. Cancel', to terminate the distance calculation process.

Options Menu

Map	Modify	View	Information	Calculate	Options	DISPLAY
Group: UNTITLED		Map List: UNNAM		Make Legend		le: MANATEE
				Set World		

Moving the mouse cursor over 'Options' in the menu bar at the top of the screen in the DISPLAY module activates a dropdown menu. The user may then select menu items or commands to reset default values that affect the entire display screen (for example, display attributes, world view in effect, screen content, etc.). A menu item is selected by clicking on its name in the dropdown menu. The choices

in the 'Options' menu are 'Make Legend' and 'Set World'. Descriptions of how the individual menu items work are given below.

- **MAKE LEGEND**

Make an output file that contains a legend for the current screen view. A series of dialogs guides the user through the process of making a legend for the GEM output file. (See 'OUTPUT' under DISPLAY 'Map Menu' for a description of using QuickMAP's GEM output files.) The legend will contain the display attributes (eg., point symbol, line style, or fill pattern) currently assigned to IDs and Groups on the Map List. Exact contents and position of the legend may be specified by the user.

The first 'Make Legend' dialog requests a name for the output file. Any valid DOS file name not already on the current directory is acceptable; the .GEM extension is supplied automatically. Radio buttons allow the user to select the following: contents of the file (everything on the 'Map List & Legend', or a 'Legend Only'); output device for which the file is being made ('Printer' or computer 'Screen'); and page orientation ('Landscape' or 'Portrait'). A file with only the legend information is sometimes convenient for combining with other "layers" of information in graphics or word processing programs. When this dialog has been completed, selecting button '1. OK' brings up a second dialog. The process may be cancelled at any time by selecting button 2.

On the second dialog, LEGEND TYPE, the user may select button 1 to include all Groups and IDs currently on the Map List, button 2 to select only certain Groups and/or IDs for inclusion, or button 3 to cancel the process.

If button '1. All Groups/IDs' is chosen on the LEGEND TYPE dialog, the next dialog requests only a LEGEND TITLE. The user may enter a title up to 25 characters in length, may accept the default "LEGEND", or may delete the default and leave the title blank. Button '1. OK' continues and button '2. Cancel' terminates the process.

If button '2. Selected Groups/IDs' is chosen on the LEGEND TYPE dialog, the next dialog requests a legend title and the selection of Groups and/or IDs to be included in the legend. After a title (25 characters or less) is entered, press <Enter> or click on '1. Select IDs.' The cursor becomes a pointing hand. Select IDs to be included in the legend by clicking on their names in the Map List, or select an entire Group by clicking on any Group member's name. If a Group is included, any display attribute assigned to the Group will be shown only once on the legend, accompanied by the Group name; names of individual IDs comprising the Group will not be shown. All the selections will be indicated on the Map List by reverse video bars. When the selections are complete, click on button '2. Done' to continue making the legend. Button 3 cancels the process.

After the legend title and Groups/IDs have been specified, the next dialog offers a selection of four text sizes that may be used for the legend. Click on one of the buttons to select 7, 10, 14, or 20 point text. A text sample of the selected size will appear near the center of the dialog. If it is satisfactory, continue the process by clicking on button '5. OK'. Or you may try another text size or select button 6 to cancel. The actual text size will appear on screen output, but that obtained on a printer depends on font availability.

The final Make Legend dialog allows the user to position the upper left corner of the legend on the output page. Positioning of the legend is based on a maximum width of 25 characters. The length of the legend (number of entries) is limited by the combination of text size and distance to the bottom of the output page. Selecting button '1. Upper Left' will place the legend title approximately 1 inch down from the top and 1 inch in from the left side of an 8 1/2" by 11" sheet of paper in landscape orientation. The button for 'Upper Right' will place the legend title similar distances from the top and right edges. For the 'Lower Left' and 'Lower Right' positions, the distance from the bottom of the page is calculated based on text size and number of entries in the legend. If you construct a legend that is too lengthy to fit on a page, QuickMAP will simply fit what it can and the rest will be truncated. Button 5 will place the legend title in the center of the paper. When positioning a legend, take into consideration that the natural page orientation for a QuickMAP display screen is landscape.

If you choose portrait orientation for your output file, the contents of the computer screen cannot be made to fill the output page vertically without distorting the scale. Instead, the screen contents occupy a "strip" across the center of the portrait-oriented paper on output. So, for example, an 'Upper Left' position for a legend will appear much further down from the top of the page in a portrait orientation because the top of the screen contents appear further down on the page.

Button '6. Specify' on the final Make Legend dialog allows the user to position the legend anywhere on the output page. If button 6 is chosen, the Status Line will show the message 'Indicate upper left corner of legend' and the cursor will become a crosshair pointer. Click at any spot on the screen where you wish the upper left corner of the legend to be located.

When the POSITION LEGEND dialog is exited by clicking on one of the buttons described above, the computer will work briefly, writing a GEM output file with the contents specified during the preceeding steps. A hard copy of the output file may be produced using the GEM Output utility, accessed through QuickMAP's GALLERY. The GEM file, including text size, legend position, etc., also may be edited using other GEM compatible software such as GEM Draw or Artline.

- **SET WORLD**

Reset the window used for the 'World View'. A dialog is displayed showing which world view is currently in effect. Four choices are offered for defining the world view: 'Mapfile extents' is the default value, and corresponds to the minimum bounding rectangle for the currently open mapfile; 'Current screen view' corresponds to whatever scaling is being used for the current display - this may be a 'Window View', 'Zoom View', etc. set by the user prior to selecting 'Set World'; Number 3, 'ID's extents' corresponds to the minimum bounding rectangle of the mapID currently selected in the 'Map List'; and 'Group's extents', which is currently inactive. The fifth control button allows the user to cancel without resetting the world. When a new world view is selected by clicking on one of the four buttons, the screen is cleared and the display redrawn to reflect the new extents. Once a world view is set, it will stay in effect until changed by the user with another 'Set World' or until DISPLAY is exited.

DISPLAY Menu

Map	Modify	View	Information	Calculate	Options	DISPLAY
Group: UNTITLED		Map List: UNNAMED			Map	DISPLAY Info
					ASSEMBLY	
					DRAW	
					GALLERY	

Moving the mouse cursor over 'DISPLAY' in the menu bar at the top of the screen in the DISPLAY module activates a drop-down menu from which the user may enter other QuickMAP program modules. A menu item is selected by clicking on its name in the dropdown menu. The choices in the 'DISPLAY' menu include 'DISPLAY Info', 'ASSEMBLY', 'DRAW', and 'GALLERY'.

Descriptions of how the various program modules can be used are given in section 3 of this manual ('An Overview and Tour of QuickMAP's Operation').

- **DISPLAY INFO**

A dialog is displayed that gives the author of the DISPLAY module and the available free memory in bytes.

- **ASSEMBLY**

Terminate DISPLAY and go to the ASSEMBLY module. The user is alerted if the current Map List has not been saved and allowed to '1. Save' or '2. Abandon' the list or '3. Cancel' the exit.

- **DRAW**

Terminate DISPLAY and go to the DRAW module. The user is alerted if the current Map List has not been saved and allowed to '1. Save' or '2. Abandon' the list or '3. Cancel' the exit.

- **GALLERY**

Terminate DISPLAY and go to the GALLERY. The user is alerted if the current Map List has not been saved and allowed to '1. Save' or '2. Abandon' the list or '3. Cancel' the exit.

QuickMAP Utilities and Their Use

Accessing QuickMAP Utilities

The QuickMAP package includes a number of "Utility" programs that allow you to exchange data with some other applications, to change data projection systems, to enter geographic control data, and to examine data and file structures of QuickMAP mapfiles. This section summarizes the utilities provided with QuickMAP and illustrates how they may be accessed via the QMUtil module. For more complete information on access and use, see the sections in this chapter about the individual utilities.

A file in "MOSS export" format, as described in the section entitled "Formats Supported by QuickMAP", is the medium of exchange for getting data into and out of QuickMAP. Several utilities provided with QuickMAP use this medium to exchange data between QuickMAP and other applications. Utilities for importing data include: MOSS2QM, which imports data in a MOSS export format into QuickMAP; DLG2QM which imports data in a Digital Line Graph format into a QuickMAP mapfile; and DB2QM which (via a MOSS format) provides a procedure to import data from various databases into QuickMAP mapfiles. There are also utilities for exporting data out of a QuickMAP mapfile. Depending on whether you wish to export selected arcs, families of arcs, or to preserve the mapID structure of exported data, the export utilities are accessed either via QMUtil or via the QuickMAP GALLERY.

QuickMAP also provides several utilities for checking the content and integrity of data files. All are accessed via QMUtil. CHKMOSS is a utility that checks the data in a MOSS export file and produces a report summarizing its contents; CHKDLG provides similar information for a DLG-3 optional format file. Three utilities are available to check QuickMAP mapfiles: CHKARCS checks the arc index against its arc coordinate records; CHKIDS checks the mapID index against its mapID table records; and CHKSETS checks a mapID's table structure. All three produce a report that may be sent to the screen, a printer, or a disk file. The AUDIT utility lists all arcs and mapIDs in a QuickMAP mapfile, while DUMPMAPF provides more technical information and may be useful when a mapfile becomes corrupted.

Other data manipulations are accomplished by QMUtil utilities CTRLPTS, LLGRID, and PROJECT. CTRLPTS allows the entry of geographic control points used for map and tablet registrations, and LLGRID uses coordinates entered at the keyboard to create a latitude longitude graticule in MOSS export format. PROJECT will reproject a QuickMAP mapfile, a MOSS export file, or individual coordinate values from one projection to another (eg., from LAT/LON to UTM).

Utilities that actually modify a QuickMAP mapfile include MERGEMAP, WEEDARCS, FIX-TABLE, FIXIDLST, and PACKMAP.

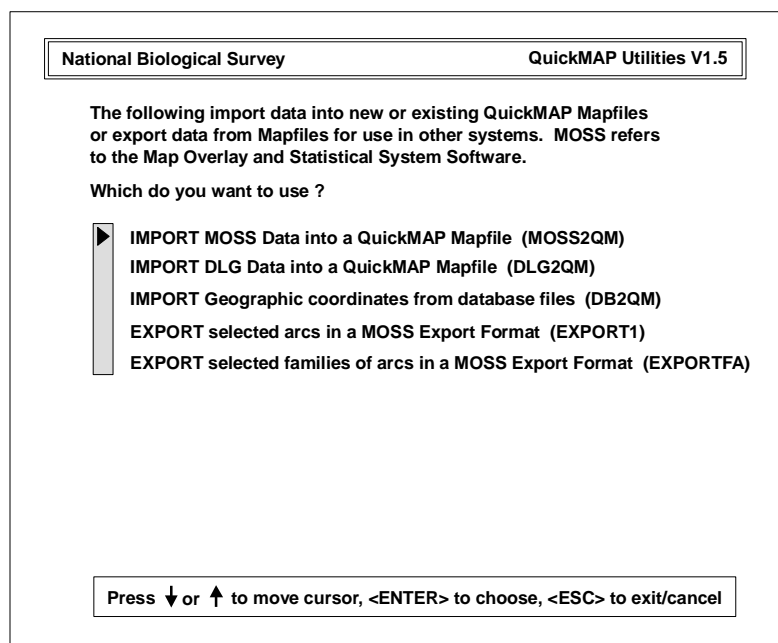
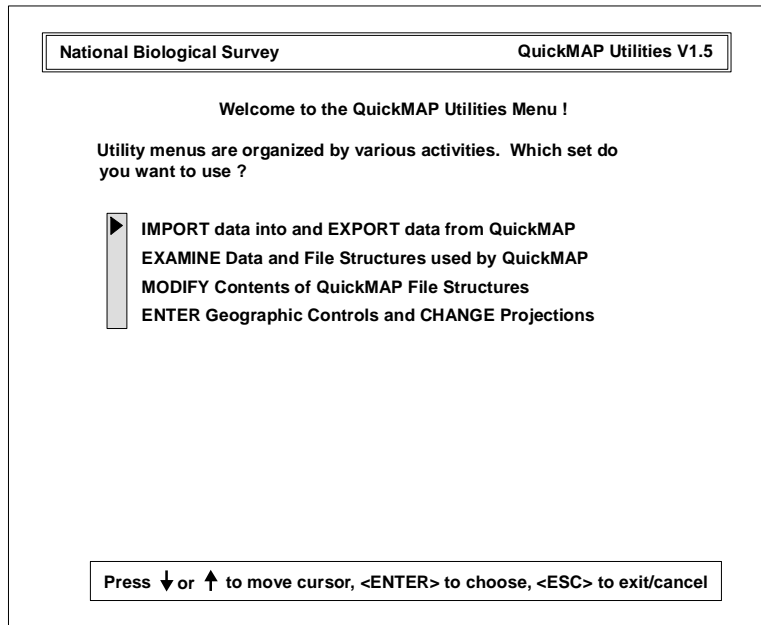
Using QMUTIL

To run QMUtil, from the QMAP directory at the DOS prompt, enter:

QMUtil

The QuickMAP Utilities Main Menu screen appears.

The QMUtil program asks questions and provides choices that you may answer by typing at the keyboard or by selecting from the menus. A blinking pointer appears to the left of one of the menu items, indicating that the menu item is currently selected. The pointer can be moved between choices with the upward and downward arrow keys. When the pointer is next to the selection you wish to make, choose it by pressing <Enter>. Also, you may leave QMUtil any time the Main Menu is on the screen by pressing <ESC>.



On the Main Menu screen, four choices are offered: an IMPORT/EXPORT option, an EXAMINE option, a MODIFY option, and an ENTER/CHANGE option.

If the first option (IMPORT/EXPORT) is chosen, a second menu will appear.

Choosing an item from this menu will allow you to IMPORT MOSS (Map Overlay and Statistical System) data, DLG (Digital Line Graph option 3) data, or geographic coordinates from other databases such as dBASE

and RBase into a QuickMAP mapfile. The same menu offers options to EXPORT individual arcs or families of arcs from a QuickMAP mapfile in MOSS export format. Pressing <ESC> returns you to the Main Menu.

If the second (EXAMINE) option is chosen from the Main Menu, a menu like the one illustrated below appears.

▶ **IMPORT data into and EXPORT data from QuickMAP**
EXAMINE Data and File Structures used by QuickMAP
MODIFY Contents of QuickMAP File Structures
ENTER Geographic Controls and CHANGE Projections

National Biological Survey	QuickMAP Utilities V1.5
The following summarize the contents of certain files used by QuickMAP and check for various types of data problems.	
Which do you want to use ?	
▶	CHECK a MOSS Export File and Summarize the Contents (CHKMOSS) CHECK a DLG-3 Optional File and Summarize the Contents (CHKDLG) CHECK a Mapfile's Arc Index against its Arc Coordinate Records (CHKARCS) CHECK a Mapfile's MapID Index against the MapID Table Records (CHKIDS) CHECK a MapID's Table Structure (CHKSETS) AUDIT a Mapfile's MapIDs and Arcs (AUDIT) DUMP a Mapfile's data structures (DUMPMAPF)
Press ↓ or ↑ to move cursor, <ENTER> to choose, <ESC> to exit/cancel	

Choosing item number one will check a MOSS Export file specified by the user and provide a summary of its contents. Item number two allows you to examine a file in DLG Option 3 data format. The next three choices check a QuickMAP mapfile specified by the user and provide information about the data and various aspects of its organization. 'AUDIT' sends a listing of the

arcs and mapIDs in a mapfile to the screen, printer or a file. The final option, 'DUMPMAPF' allows access to the information in a mapfile's header, as well as the arc and mapID structure. Again, pressing <ESC> returns you to the Main Menu.

If the third option (MODIFY) is chosen from the Main Menu, the menu illustrated on the next page appears.

▶ **IMPORT data into and EXPORT data from QuickMAP**
EXAMINE Data and File Structures used by QuickMAP
MODIFY Contents of QuickMAP File Structures
ENTER Geographic Controls and CHANGE Projections

Selecting item number one runs a utility program that combines mapIDs from two different QuickMAP mapfiles. Menu item two selectively removes points from the arcs in a mapfile, based on tolerance criteria set by the user. 'FIXIDLST' and 'FIX-TABLE' correct problems with a mapfile's arc and ID structure, and PACKMAP eliminates unused blocks of space making a mapfile more compact for storage.

National Biological Survey	QuickMAP Utilities V1.5
The following are used to alter the contents or organization of certain files used by QuickMAP to meet specific project requirements.	
Which do you want to use ?	
▶	MERGE MapIDs from one Mapfile to another (MERGEMAP)
	WEED Coordinates in a Mapfile to a specified tolerance (WEEDARCS)
	FIX Pointers to Arcs in ID Tables (FIXTABLE)
	FIX ID Names in Arcs' ID Lists (FIXIDLST)
	PACK a Mapfile to reclaim unused space (PACKMAP)
Press ↓ or ↑ to move cursor, <ENTER> to choose, <ESC> to exit/cancel	

▶	IMPORT data into and EXPORT data from QuickMAP
	EXAMINE Data and File Structures used by QuickMAP
	MODIFY Contents of QuickMAP File Structures
▶	ENTER Geographic Controls and CHANGE Projections

If the fourth option (ENTER/CHANGE) is chosen from the Main Menu, a menu with five choices appears.

National Biological Survey	QuickMAP Utilities V1.5
The following are used to establish relationships between a Mapfile's coordinate system and locations on the surface of the earth.	
Which do you want to use ?	
▶	CREATE a MOSS Export File with Geographic Control Points (CTRLPTS)
	CREATE a MOSS Export File with Latitude/Longitude Graticule (LLGRID)
	CHANGE Projection of a QuickMAP Mapfile (PROJECT)
	CHANGE a MOSS Export File's Projection (PROJECT)
	CHANGE a coordinate value to another projection (PROJECT)
Press ↓ or ↑ to move cursor, <ENTER> to choose, <ESC> to exit/cancel	

The first choice allows you to enter at the keyboard, geographic control points to be used for map or tablet registration. The second choice creates a file containing a latitude/longitude grid spanning an area specified by the user. The last three 'PROJECT' options change the projection of all the data in a QuickMAP mapfile, of all the coordinate values in a MOSS Export file specified by the user, or of individual coordinate values entered at the keyboard. Pressing <ESC> returns you to the Main Menu.

Data Exchange and Manipulations

Formats Supported by QuickMAP

At present, three distinct file structures are used to exchange QuickMAP graphics or map data with other applications: GEM metafiles, Digital Line Graph (DLG) optional format with level 3 topology, and formats for interchange between AMS (Analytical Mapping System) and MOSS (Map Overlay and Statistical System). The latter is often referred to as being in a "MOSS export" format.

MOSS Export Format

A MOSS export file is an ASCII format file readable by the U.S. Department of Interior's MOSS public domain Geographic Information System.

The file consists of a variable number of items, each of which can represent either a point, line, or polygon map feature. Only a single type of feature can be represented in any given file. A point item usually consists of a single coordinate pair. A line item has two or more coordinate pairs. Occasionally, a point may be represented as a "degenerate line" (i.e. two coordinate pairs that are identical). Polygon items have three or more coordinate pairs in a clockwise order. The line formed by the coordinates closes on itself to form an outline (i.e. the first and last coordinate pairs are identical). One or more hole segments may exist as islands inside a polygon. In a MOSS export file, the coordinates representing a hole follow the set of coordinates representing the polygon which contains them. Each hole must also be closed and have three or more coordinate pairs, but the data are ordered counter-clockwise. All polygons do not necessarily have holes, but holes are always part of a polygon item when present.

Each item in a file begins with a header line which is 55 characters long, is followed by a line feed, and contains three fields (Table 1). Each line following the header contains a single coordinate pair.

Table 1. Description of an item's header in a MOSS export file

Character position	Field description
1 - 5	item number (integer). Typically start with "1" and numbered consecutively
6 - 15	blank spaces (unused)
16 - 45	attribute field (also known as the subject value)
46 - 50	blank spaces (unused)
51 - 55	number of coordinate pairs in item (integer)

Geographic coordinates (i.e. latitude and longitude) are represented differently than those in other projections. Some systems may indicate geographic coordinate records by a negative item number. In the coordinate record, the longitude (X) value precedes the latitude value, and both are in decimal degrees rather than degrees, minutes, and seconds. Additionally, longitude values in the western hemisphere and latitude values in the southern hemisphere are identified by negative values. The first coordinate pair of a hole, or island, within a polygon is indicated by a non-zero value in a field following the X and Y coordinate fields. Each coordinate value may have up to five decimal places of precision, which is sufficient to resolve distances of less than a meter on the earth's surface when converted to a planar map projection. The FORTRAN format for a geographic coordinate record is (F10.5,1X,F9.5,1X,I1). The "F10.5" is for the longitude value; it means a total of 10 places, with four preceding the decimal point, one for the decimal point, and five after the decimal. The four places before the decimal allow for a possible negative sign and a three-digit number. The "F9.5" is for the latitude value, providing for a possible negative sign, a two-digit number, a decimal point, and five digits following the decimal. The "I1" is for the Hole or Island tag (non-zero value indicating start of a hole). The "1X" between values represents 1 blank space.

A FORTRAN format of 2F11.2 is used to specify coordinate records for other planar projections. This represents two adjacent fields, each a total of 11 spaces long, including 2 places following the decimal point. In addition, X coordinate values must always be positive since the presence of a polygon hole is indicated by a negative X coordinate value. However, this does not imply that the closing X coordinate value for a hole is also negative.

Many systems handle polygon information in ways closely related to a MOSS export file format but some known distinctions should be pointed out to minimize possible conversion problems. First, either latitude/longitude or UTM coordinates are preferred for data exchange because these projections were the only two originally used in MOSS export files. The maximum number of points in an item will be system dependent (i.e. when converting QuickMAP data to a MOSS format, polygons may be too complex to be imported elsewhere). Also, proper line length as well as exact field placement in the export file format is critical when transferring data between most computer applications.

Special extensions have been added to QuickMAP utilities to allow handling of MOSS-like export files. In particular, other projections and coordinate systems may be used, but UTM conventions must be followed. This means that projections having negative X coordinate values must be shifted to all positive values so that polygon holes may be flagged by negative values. When imported into QuickMAP, items are converted to one or more arcs, and feature types (point, line, polygon) are ignored. Thus, items of virtually any size and complexity can be processed. Family and arc names are automatically generated from the attribute field and item number. Importing data as arcs, and ignoring features, also allows multiple feature types to be included in a single file. In addition, multiple point features can be imported as a single item rather than requiring individual headers for each point. QuickMAP does not require that polygon outline and hole

segments be closed. Finally, data may be exported as arcs or polygons, providing the user an option to eliminate redundant coordinates in adjacent polygon features.

An example of a MOSS export file is shown below. Note that the first header line is for a ditch, and includes an item number ("148"), an attribute field ("SWDITCH"), and the number of coordinate pairs in the item ("10"). Following the header is the list of ten coordinate pairs that form the ditch item. Also in the file are 4 wells, each with 2 identical coordinate pairs representing point data, and a pond, with 59 coordinate pairs. Coordinate pair number 44 of the pond data is preceded by a negative sign, indicating the beginning of a hole. The pond is a polygon with a hole representing an island.

Sample MOSS Export File

148	SWDITCH	10
3087551.10	1227017.28	
3087565.83	1227052.58	
3087580.65	1227077.83	
3087595.48	1227103.09	
3087615.47	1227113.33	
3087635.36	1227133.61	
3087645.17	1227158.82	
3087644.92	1227183.93	
3087644.63	1227214.07	
3087639.27	1227249.18	
149	SWWELL	2
3088111.61	1227228.63	
3088111.61	1227228.63	
150	SWWELL	2
3087904.14	1226347.63	
3087904.14	1226347.63	
151	SWWELL	2
3086464.92	1226107.70	
3086464.92	1226107.70	
152	SWWELL	2
3086066.15	1225792.43	
3086066.15	1225792.43	
153	SWPONDS	59
3086175.43	1226516.79	
3086165.58	1226491.55	
3086155.73	1226466.32	
3086150.87	1226446.15	
3086141.02	1226420.92	
3086136.12	1226405.78	
3086126.27	1226380.55	
3086126.44	1226360.43	
3086121.53	1226345.29	
3086116.67	1226325.13	
3086106.66	1226320.02	
3086091.52	1226324.92	
3086066.37	1226324.71	
3086031.20	1226319.38	
3086011.08	1226319.21	
3085995.99	1226319.09	
3085975.91	1226313.89	
3085965.81	1226318.83	

3085940.49	1226338.74
3085915.21	1226353.62
3085889.93	1226368.50
3085874.72	1226383.46
3085864.53	1226398.47
3085864.36	1226418.59
3085864.36	1226418.59
3085874.25	1226438.79
3085889.17	1226459.04
3085904.18	1226469.23
3085924.21	1226479.46
3085944.21	1226494.72
3085964.24	1226504.95
3085984.32	1226510.15
3086004.44	1226510.32
3086024.52	1226515.52
3086049.63	1226520.76
3086064.72	1226520.89
3086084.84	1226521.06
3086094.90	1226521.14
3086115.02	1226521.31
3086130.11	1226521.44
3086170.40	1226516.74
3086175.43	1226516.79
- 3086015.10	1226439.98
3086000.01	1226439.85
3085989.95	1226439.77
3085985.00	1226429.67
3085980.05	1226419.56
3085980.14	1226409.50
3085985.21	1226404.51
3086000.34	1226399.61
3086005.38	1226399.65
3086020.42	1226404.81
3086020.42	1226404.81
3086025.37	1226414.91
3086025.24	1226430.00
3086020.17	1226434.99
3086015.10	1226439.98
3086015.10	1226439.98

DLG Format

Digital Line Graph (DLG) format was designed by the USGS National Mapping Program to serve as a medium of exchange for geographic information. DLG data is line map information described by a digital data set in vector form. USGS Earth Science Information Centers distribute data for planimetric base categories including transportation, hydrography, hypsography, boundaries, surface cover, geodetic survey controls, and Public Land Survey System.

Three levels of data encoding are possible, although level three (DLG-3), having a full range of attribute codes and being fully topologically structured, is the most widely accepted. USGS distributes data in a "standard" and an "optional" format. Topology for the "standard" format is contained only in line elements, and coordinates are related to the base map encoded (ie., thousandths of a map inch). The "optional" format contains explicit topological linkages between all point, line and area features and is represented in a geographic coordinate system (ie., UTM). QuickMAP supports only DLG-3 data in an "optional" format.

Encoding a map in DLG format involves expressing the map graphic in digital form in a way that preserves the spatial relationships between features. A DLG-3 file is composed of three types of elements: nodes, which mark the start and end of every line; lines, which are ordered sets of points beginning and ending at nodes, and which describe the shape and location of linear features on the map; and areas, which are parts of the map bounded by lines and each of which is identified by a point within the bounded area, which represents the characteristics of the area. Information about how these elements are connected and what they are adjacent to is explicitly contained in the topological structure of the data file. For more information on DLG formats, see the US GeoData Data Users Guides for the particular map series of interest (1:24000 or 1:100000).

Attribute codes may also be included in a DLG file, and are used to describe the features represented by nodes, lines and areas. For example, an attribute code might specify that a certain line represents a canal. A DLG numeric attribute code includes a three-digit major code and a four-digit minor code. The major code identifies the main category to which the element belongs, such as hydrography, boundaries, etc. The minor code provides a more detailed specification, such as duck pond, lake or reservoir. In a DLG file, or in any associated Lookup Table, major and minor attribute codes are recorded in two six- digit integer fields, right justified with leading blanks.

For more information about attribute codes currently being used by the USGS National Mapping Program, see: **Standards for Digital Line Graphs, Part 3: Attribute Coding**

available from: **User Services Branch**

National Cartographic Information Center

U.S. Geological Survey

507 National Center

Reston, Virginia 22092

A portion of a DLG-3 file is illustrated on the next page. The file consists of four sections. The top section contains descriptive information about the data including its source, date of origin, scale, units of measurement, projection parameters and geographic coordinate controls. All USGS DLG-3 file data are expressed in meters in the UTM coordinate system, although data from other vendors and sources may use different units or map projections. Following the top section of the file is the name of the first data category, "WETLANDS" in the example.

The next three sections contain, in order, node, area, and line records with associated topology and attributes. Each record begins with an "N", "A" or "L" to identify the element as a Node, Area or Line. This is followed by an internal sequence number used to define topology. Other information, such as the number of attribute codes and coordinate pairs in the element also may be included. In Optional format, a listing of the actual X,Y coordinates that define the node, area, or line follows. Attribute codes associated with the element may also be listed, but this is optional. Data from some sources may lack attribute information or require special treatment to be included. Such data may still be processed by QuickMAP but probably will have limited usefulness.

Two QuickMAP utilities, CHKDLG and DLG2QM, are described later in this chapter. CHKDLG examines and produces a summary report of a DLG file. DLG2QM imports the data from a DLG-3 file into a QuickMAP mapfile.

NATIONAL WETLANDS INVENTORY DATA

```

BENNETTS PIER          1981    24000
  3  1 18  2 0.61000001431D+00  4  0  4  1
-0.7500000000000000D+08  0.3900000000000000D+08  0.0000000000000000D+00
0.0000000000000000D+00  0.0000000000000000D+00  0.0000000000000000D+00
0.0000000000000000D+00  0.0000000000000000D+00  0.0000000000000000D+00
0.0000000000000000D+00  0.0000000000000000D+00  0.0000000000000000D+00
0.0000000000000000D+00  0.0000000000000000D+00  0.0000000000000000D+00
0.100000000000D+01  0.000000000000D+00  0.000000000000D+00  0.000000000000D+00
SW      39.000000 -75.375000      467527.21  4316635.48
NW      39.125000 -75.375000      467584.42  4330506.80
NE      39.125000 -75.250000      478389.63  4330469.61
SE      39.000000 -75.250000      478351.49  4316598.32
WETLANDS          200    200 01 121  121 010 276 276 1
N      1  469704.70  4319598.15    0   3   0   0   0
      2   9   56
N      2  469703.04  4318542.61    0   3   0   0   0
      19 -36 185
.
.
.
A      6  471496.52  4316778.37    0   3   0   1   0   0
      4  245   -5
      4   0
A      7  469157.56  4319482.92    0  80   0   1   0  18
      6  -23   87  -22   86  -21  -37  -19  -36   85  -35   80
     -34   79  -33  -48  -32   77  -31   78  -30   83  -29   76
     -28   82  -27   74  -26   81  -25  -46  -24  273  -52  -51
     -50  -57  -55  -42  -56   9   73   10   0   84   0   75
      0   72   0   71   0   70   0   69   0   66   0  -65
      0  -64   0  -47   0  -45   0  -44   0  -43   0  -41
      0  -40   0  -39   0  -38   0  -20
      5   0
.
.
.
L      5   25   170   6   5          20   0   0
     471357.61  4317039.41  471360.13  4317022.45  471363.83  4317001.52
     471369.26  4316981.46  471380.89  4316966.89  471397.46  4316941.29
     471404.23  4316912.64  471412.75  4316895.00  471433.44  4316866.96
     471454.80  4316835.17  471469.98  4316805.40  471484.67  4316780.46
     471490.77  4316756.66  471495.81  4316724.94  471493.46  4316693.24
     471491.01  4316680.48  471511.77  4316673.14  471533.02  4316657.21
     471549.60  4316632.93  471559.86  4316619.90

```

Lookup Table Format

Attribute information in DLG files must be numeric and is limited to a single pair of values. Lookup tables are simple ASCII text files used by QuickMAP to better handle the exchange of attribute information with DLG data transferred when generated from other GISs such as Arc/Info. The table consists of at least three fields (columns) and one or more lines (rows). Fields are in a specific format (2I6,A10) containing the DLG file major and minor code pairs and associated mapID names. Each line in the table is used to assemble a mapID table structure from associated major minor codes of DLG node, area, and line records.

Additional information, which QuickMAP ignores, may be included on each line after the mapID name in the lookup table. Such information could describe the mapID codes themselves more fully, or even incorporate additional attribute information from a GIS which generated the DLG data. This flexibility allows multiple attributes associated with QuickMAP mapIDs to be imported and managed by a database management system of your choice and provides a means to automate the aggregation of mapIDs into groups used in the DISPLAY module.

Illustrated below is a portion of the Lookup Table used with the Bennetts Pier DLG data illustrated in the preceeding section. This table was prepared by editing an attribute listing distributed with the National Wetlands Inventory data. The attribute classification scheme was designed by US Fish and Wildlife Service, and the listings are distributed with NWI data upon request. The first I6 (Integer, 6 places) field represents the major code and contains a number from 1 to 31, right justified with leading blanks. The second I6 field (minor code) contains, in every case, a 0 (zero). The third field (Alphanumeric 10) is a coded description of the feature, left justified. For the first row, then, major code=1, minor code=0, and attribute description is E1OWL. This information would be linked with one or more records in the DLG file and used to build topology in the form of mapIDs.

1	0E1OWL
2	0E2BBP
3	0E2EM1PD
4	0U
.	
.	
.	
28	0PSS3/EM5A
29	0PFO1EH
30	0E2FLN
31	0E1OWLX

GEM Format

QuickMAP's ASSEMBLY and DISPLAY modules write special output files with the .GEM extension. The GEM (for Graphics Environment Manager) format used in these files is a product of Digital Research, Inc. and is their method of storing graphical information in vector form.

When required to make output, QuickMAP writes a "metafile". A metafile may be thought of as a generic picture file, because it contains graphical image information in a form that is independent of specific output devices. This means that the same metafile may be input successfully to a computer screen, printer, plotter, or other display device.

Unlike the MOSS export and DLG files discussed in previous sections, .GEM files are not ASCII text and therefore cannot be viewed and modified using a text editor. To view and edit the information in a .GEM file, you must use other GEM software such as GEM Draw, Artline, or Presentation Team (all from Digital Research). There are also special programs available commercially (eg., Hijaak by Inset Systems) that will convert .GEM files to other formats for use with other software.

Similar to ASCII text files serving as a medium of exchange between word processing packages, metafiles may serve as a medium of exchange for graphics processing. But, also like transferring text between word processing packages, the conversion of graphics information in a metafile is not always "clean". Problems will arise due to differences in how graphical information is interpreted between GEM and other software and even within the GEM software family. For output files made by QuickMAP, this will show up most frequently as differences in how polygon fill patterns appear when .GEM files are imported into other software packages. The fill patterns that give the most consistent results when translated to other software and output devices are the hatch patterns. With some software, all point markers from QuickMAP (+, *, x, etc.) are converted to dots. You will undoubtedly have to experiment with your particular combination of hardware (output devices) and software before you achieve the results you desire.

Data Import Utilities

MOSS2QM

Map, or locational, data may be acquired in digital form from other sources and imported into an existing or new QuickMAP database (or mapfile). In particular, small amounts of data representing geographic control points are imported to register maps of various scales and projections on a digitizing tablet and relate them to a common geographic reference for cartographic purposes. Coordinate data being imported by MOSS2QM must be in a MOSS export format. This is a standard data interchange format documented in a previous section of this chapter. It is most frequently used to exchange polygon data between different Geographic Information Systems.

The MOSS2QM utility is used to convert coordinate data in a MOSS export format into arc data in a QuickMAP mapfile. The data may first be converted to the map projection of choice using the PROJECT utility prior to using MOSS2QM. Projections should match when importing data into an existing QuickMAP mapfile. The user must be responsible for insuring that projections match since MOSS export files contain no projection parameters. In any event, QuickMAP mapfiles should always be backed up prior to importing new data into them since the nature of imported data is not always understood. Problems with the import process can lead to corrupted data, doing irreparable damage to the entire mapfile!

It is recommended that you run the ChkMOSS utility on MOSS export files before attempting to import the data into QuickMAP mapfiles. ChkMOSS will detect possible projection incompatibilities and format errors so you may correct them before proceeding with MOSS2QM. Also, the table output file written by ChkMOSS can be used to specify which attributes are imported using MOSS2QM's Import Option 3; this is discussed below. For a description of the ChkMOSS utility, see the section "Examining Data and File Structures Used by QuickMAP" later in this chapter.

To run MOSS2QM begin by running QMUtil as described previously. Select the IMPORT/EXPORT option on the Main Menu.

▶ **IMPORT data into and EXPORT data from QuickMAP**
EXAMINE Data and File Structures used by QuickMAP
MODIFY Contents of QuickMAP File Structures
ENTER Geographic Controls and CHANGE Projections

▶ **IMPORT MOSS Data into a QuickMAP Mapfile (MOSS2QM)**
IMPORT DLG Data into a QuickMAP Mapfile (DLG2QM)
IMPORT Geographic coordinates from database files (DB2QM)
EXPORT selected arcs in a MOSS Export Format (EXPORT1)
EXPORT selected families of arcs in a MOSS Export Format (EXPORTFA)

Then select the first option, 'IMPORT MOSS Data into a QuickMAP Mapfile', from the IMPORT/EXPORT menu.

The display will be cleared and MOSS2QM will begin:

******* MOSS2QM - Import Utility for Data in a MOSS Export Format *******

Import Arcs into Mapfile:

The path to your QMAP directory will automatically be entered as a default. Use the editing keys to change the path if necessary, and enter a valid QuickMAP mapfile name. The name must not include a file extension. The program will ask for confirmation to create a new mapfile if the one entered can not be found. Entering anything other than 'yes' or 'Y' (the default 'Y' may be selected by pressing < Enter>) at this point will stop the program. After access to the mapfile is established, the program displays

Current directory is: C:\QMAP

(or whatever drive and directory you gave for the location of the mapfile). The next prompt is:

Send output to [F]ile, [P]rinter, or [S]creen? F

A summary of MOSS2QM's activity will be sent to the screen, printer, or to a file. The "F" that appears after the prompt indicates that File is the default and may be selected by pressing < Enter>. If [F]ile is selected, the next message will be:

Send Output to MAPFILE.m2q

where "MAPFILE" is the mapfile name given previously. If an output file by that name already exists from importing arcs into the same mapfile at another time, you will be asked whether to [A]ppend to or [R]eplace (write over) that output file.

Then:

Import Coordinates from MOSS export file:

The name you enter may be a full path name, including an extension, for an existing file in a valid MOSS export format. If the file can not be found, the user is prompted for another name.

The next prompt offers three choices.

Select Import Option:

1 = Import all Map Names

2 = Import one Map Name specified from keyboard

3 = Import Map Names specified in a file

? 1

If option 1 is chosen, all data in the coordinate file will be imported into the mapfile. If option 2 is chosen, the user is asked to enter the

Map Name to be imported (30 characters max):

If a name shorter than 30 characters is entered, the program pads the rest of the name field with blanks. As an example, refer back to the sample MOSS export file shown in the section "Formats Supported by QuickMAP." If it were used as the input file and the user gave "SWDITCH" for *Map Name to be imported*, only the arc with the header line

148	SWDITCH	10
-----	---------	----

would be imported.

If Import Option 3 is chosen, the user is asked for more information. First,

Read Map Names from text file:

Give the name of a text file containing the map names you wish to import. The next prompt is:

Do you wish to verify imported items? N

If "Yes" is chosen instead of the default, the program will list the name of each match before importing it and wait for the user to verify that it should be processed.

Next, the program asks for the

Column where Map Name field begins: 1

Column 1 is the default. Finally,

Width of Map Name field: 30

For option 3, the names are padded to a length based on the beginning column and field width specified by the user.

As the program reads the lines from the MOSS export file, it compares the header line for each arc to the names found in the Map Name input file. If a match is found, and verification is turned off (default response to verification question above), the arc is imported. If verification is turned on, each time a match is found the user is prompted to verify if that particular arc should be imported or skipped.

Any text file containing map names for which the user can specify position by columns can be used as the map name input file for option 3. The table output file written by the CHKMOSS utility can be used; its format is recognized by MOSS2QM and the extraneous information (column labels, etc.) is eliminated, leaving only the lines containing attribute names.

As an example of how option 3 works, suppose you are importing arcs from the sample MOSS export file shown on pages 5-10 and 5-11. The input file containing map names looks like:

```
SWDITCHES
SWWELL
SWLAKES
```

If you specify the beginning map name column as 1 and the field width as 10, only the four "SWWELL" arcs will be selected from the MOSS export file. MOSS2QM first pads all map names in the input file to a total length of 10. This would result in the following map names: "SWDITCHES ", "SWWELL ", and "SWLAKES ". It then looks for arc names in the MOSS export file that match any of the padded map names. The only attribute name that matches all ten positions is "SWWELL".

If you specify the beginning map name column as 1 and the field width as 1, MOSS2QM uses only position 1 of each entry in the map name file. So, anything beginning with an "S" will be used as a match; all six arcs from the MOSS export file will be selected for import. Thus, judicious selection of column positions will allow you to select very specific groups of attributes to import.

After MOSS2QM verifies that there is data to be processed that is not in decimal degree format, the program pauses and displays the following:

Select option used to mark holes in polygons:

- 1. Negative X coordinate values***
- 2. Non-zero value in trailing field***

? 1

As discussed in the section on "MOSS Export Format", most MOSS export files use the default method of negative X coordinate values to mark the beginning of holes. Files containing Geographic (latitude/longitude) coordinates, and any other files containing actual negative coordinates use option 2.

The program reports the item numbers as they are processed. If choice 3 is being used with the verification option "turned on", each item is listed for the user to verify whether it should be imported.

The output being sent to a disk file ("mapfile.m2q") or to the printer lists the topology to be used to assemble mapIDs in QuickMAP. For our example of importing all six arcs in the sample MOSS export file, the topology table would look like the following:

Mapfile: testmap

Coordinates from MOSS export file: testmap.utm

```

-----
Item  Attribute Name      Attribute      Type      Arc      Arc      Points
=====  =====  =====
148  SWDITCH              10 points   Line      SWDITC   148     10 points
149  SWWELL                2 points   Point     SWWELL   149     2 points
150  SWWELL                2 points   Point     SWWELL   150     2 points
151  SWWELL                2 points   Point     SWWELL   151     2 points
152  SWWELL                2 points   Point     SWWELL   152     2 points
153  SWPONDS              59 points   Outline   SWPOND   153     43 points
                                Hole      SWPONDH   1       16 points
-----

```

Potential differences among systems are detected and handled automatically. For instance, an item's attribute name may be converted to a valid arc name that begins with one to six letters followed by a number from 1 to 999. Holes contained within polygons are identified as individual arcs. Messages may be reported during processing and the user may need to supply additional information. If, for example, the arc name assigned an item already exists, the user is requested to provide a new and unique name. If this happens, it is recommended that you use a different family name to contain the arcs with name conflicts.

Errors detected and error handling are similar to those described for the ChkMOSS utility in a later section. Errors that typically indicate data problems will stop the program and the error will be written to a file named "mapfile.ERR" (where "mapfile" is the name of the mapfile currently being imported into). Most of these errors can be corrected in the MOSS export file using a text editor. For example, the number of coordinates in the last item header processed may not correspond to the number that actually follows the header, or one or more coordinates may be improperly formatted.

When the processing is completed, the number of arcs processed is reported and the program announces 'Finished'. If, at the beginning of the program, the user chose to send output information to a disk file, a reminder of the name of that file is issued. Then you will be asked:

More Utilities?

If you enter 'Y', you will be returned to the QMUtil IMPORT/EXPORT menu. Entering 'N' will terminate QMUtil and return you to DOS.

The resulting mapfile may now be opened in QuickMAP for display, editing, or assembly of the imported arcs.

MOSS2QM naming conventions

When MOSS2QM imports arcs into a QuickMAP mapfile, certain conventions are observed in naming those arcs. First, MOSS2QM makes no distinction among point, line, or polygon data; the only distinction is between holes and non-holes. In the following discussion, the term "polygon" refers to the first arc below a header line in a MOSS export file, though it may actually be a point, line or polygon. An example of a polygon containing a hole, as it would appear in a MOSS file is illustrated below.

The top line is called the "header". The lines following the header consist of the data coordinates (an X value and a Y value on each line) that define the arcs. This data format is described more completely in the section of this chapter entitled "Formats Supported by QuickMAP". In the above

1	lakeww22-489 northern side	10
10.00000	20.00000	
20.00000	20.00000	
20.00000	10.00000	
10.00000	10.00000	
10.00000	20.00000	
-12.00000	18.00000	
18.00000	18.00000	
18.00000	12.00000	
12.00000	12.00000	
12.00000	18.00000	

example, the negative sign in front of the sixth coordinate pair marks the beginning of a hole. The hole is within the polygon arc defined by the first five coordinate pairs.

In naming a polygon, MOSS2QM starts with the second part of the header line ("lakeww22-489 northern side" in the above example). All numbers and special (non-alphabetical) characters are removed, and the name is truncated to a length of six characters. This six-letter identifier ("lakeww" in the example) is the family name. Next, the left-most number in the header line is appended to the family name to give the individual arc name. In the above example, this process would result in the name "lakeww1" for the imported arc.

To name a hole within a polygon, MOSS2QM appends an "H" to the polygon family name. Individual arc numbers are assigned by MOSS2QM, and are sequential within each "hole" family. In the example, the hole would be named "lakewwH1".

Exceptions to the conventions discussed above occur when arcs exceed the maximum length allowed by MOSS2QM, 2048 points. If an arc exceeds the maximum, it is split into multiple arcs, each consisting of 2048 or less points. MOSS2QM then appends an "S" (for "Split") to the family name. Individual arcs within a split family are numbered sequentially.

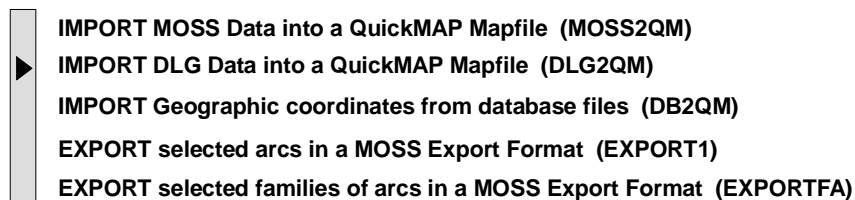
If a hole exceeds the maximum length, it is split into multiple arcs and a "Z" replaces the "H" in the family name. Individual arcs within the "split" hole family are then numbered sequentially.

DLG2QM

DLG2QM (for "Digital Line Graph to QuickMAP") is a QuickMAP utility that imports data in a DLG optional format with level 3 topology into a QuickMAP mapfile. In addition to importing the data into a mapfile, DLG2QM automatically assembles the imported arcs into mapIDs with attributes assigned from the DLG file or from a lookup table. (See the sections on DLG format and Lookup Table format for details on their structure.)

It is suggested that, before running DLG2QM, you evaluate your DLG data file using ChkDLG in the QMUtil EXAMINE menu. (See the section in this chapter entitled "Examining Data and File Structures Used by QuickMAP".) This may reveal potential problems with the data that can be corrected prior to running DLG2QM.

Begin by running QMUtil as described previously. Select the IMPORT/EXPORT option (number 1) on the QMUtil Main Menu. Then select the second

A screenshot of a menu box with a vertical list of options. A grey arrow points to the second option, 'IMPORT DLG Data into a QuickMAP Mapfile (DLG2QM)'.

- IMPORT MOSS Data into a QuickMAP Mapfile (MOSS2QM)
- IMPORT DLG Data into a QuickMAP Mapfile (DLG2QM)
- IMPORT Geographic coordinates from database files (DB2QM)
- EXPORT selected arcs in a MOSS Export Format (EXPORT1)
- EXPORT selected families of arcs in a MOSS Export Format (EXPORTFA)

option, 'IMPORT DLG Data into a QuickMAP Mapfile', from the second menu. The display will be cleared and a message will be displayed:

Enter DLG filename:

The path to your QMAP directory will automatically be entered as a default. Edit this as necessary and include the full DLG file name with extension. If the file name entered cannot be found, you will be given another chance to fill in a valid DLG file name. When the file is found, a menu will be displayed.

Build MapIDs: ***1) for all points and lines***
 2) for each major minor code
 3) for Lookup Table (ie major/minor/mapid values)
 4) for intermediate dlgs files

Select option: 1

Note that the fourth option in the 'Build MapIDs' menu is displayed only under certain circumstances and will be discussed later in this section.

When an option is selected, the following prompt will be displayed.

Output file is

The output file will contain a summary of the conversion process. The path and DLG file name provided previously (with the ".DLG" extension replaced by ".OUT") will automatically be entered as a default. You may accept the default or edit to a path and name of your choice.

Selecting option '1) for all points and lines' will create a QuickMAP mapfile and process the DLG data to be imported. This option does not use topology but is useful to preview the data and determine its suitability for a particular application.

Option '2) for each major minor code' will create a QuickMAP mapfile, import the DLG data, and build topology for major minor codes given in the DLG file. In this case, a separate mapID will be built for each unique major minor code. The utility handles situations in which a feature is tagged with multiple major minor codes.

Option 3 also creates a QuickMAP mapfile, but builds the topology of major minor codes in the DLG file into mapID tables based upon code pairs and mapID names in a Lookup Table. (See

0	1	LAND
0	2	WATER

the section on Lookup table format, following the DLG format section, for details.) For instance, the simple lookup table at left allows associated major minor codes in a DLG file to be assembled into a mapfile with the two mapIDs named "land" and "water".

Note that each line contains a unique set of three fields comprising major code, minor code, and mapID name.

The lookup table may contain as many of these sets as needed and is not required to be in any sorted order. Only major minor codes found in both the lookup table and the DLG file are imported and have their topology built into mapID tables when this option is used. Thus, the user may selectively extract data from the DLG file by including only certain codes of interest in the lookup table.

While each set of fields must be unique, QuickMAP allows lookup tables to contain relationships between a single code pair and many mapIDs, and vice versa. This flexibility allows DLG data to be assembled into multiple overlapping and/or aggregated attributes without the need to duplicate any coordinated data. Any major minor codes found in one file but not the other are reported by the program and listed in the '.OUT' file mentioned previously.

If option 3 is selected from the menu shown above, you will be prompted to:

Enter filename of Lookup Table:

The path and filename (without extension) that was given for the DLG file to be processed will be shown automatically as a default. This default may be accepted by pressing < Enter> or modified using the edit keys, or you may enter a new filename. Then the display will show:

Processing Lookup Table record ...

and will list the number of each attribute found in the lookup file. Error messages will indicate any problems with the lookup table.

For option 1, 2, or 3, the next prompt will be:

Enter mapfile into which data will be imported:

Again, the base name given for the DLG file being converted will be used automatically as a default, or you may modify it or enter a different mapfile name (no extension). In any case, the mapfile must not already exist (ie., it must be a "new" one). The program will not overwrite a previously existing mapfile. Next,

Creating mapfile MAPFILENAME ...

will be displayed, followed by the prompt

Enter base family name (1-5 characters) for arcs:

The DLG file name, with any numbers removed and truncated to a total length of five characters if necessary, will be used as a default arc family name. Or, you may enter any valid five character arc family name instead. If the DLG file contains more than 999 arcs, this family name will be alphabetically incremented (FAM998, FAM999, FAMA1, FAMA2,...).

The next message will be:

Processing descriptive records ...

followed by information read from the DLG file, including: the map name, sectional locator, date, scale, projection and units of the source data; projection parameters and control points, if supplied; and the number of node, area, and line records in each category. Next, you will be asked:

Import category? Y

You may accept the default 'Y' to complete the process or 'N' to terminate and be returned to the QMUtil IMPORT/EXPORT menu. If you answer 'Y', the number of each node will be listed on the screen as it is processed, then the total number of nodes and a range indicating the internal ID numbers corresponding to the node numbers listed. The same information will be displayed for area records and line records as they are processed.

If option 2 or 3 was selected, some additional information will accompany the building of mapID tables.

Finally, a summary of the category's contents in terms of major minor codes, mapIDs, arcs, coordinates and records will be displayed. Then, the messages

***Finished building [mapfilename]
More Utilities? Y***

will indicate that the process is complete. You may answer 'Y' to return to the QMUtil IMPORT/EXPORT menu or 'N' to return to DOS.

When DLG2QM is finished, run ChkArcs, ChkIDs, and ChkSets to check the integrity of the resulting QuickMAP mapfile. These utilities are described in the section "Examining Data and File Structures Used by QuickMAP" in this chapter.

As DLG2QM runs, a number of files are written to the directory containing the DLG file being processed. Ten of these files are given the same name as the DLG file, with extensions .QMA, .QMI, .QMT, .QMV, .OUT, .ALL, .EXC, .IDX, .MBR, and .PTS. The first four (.QMA, .QMI, .QMT, and .QMV) comprise the QuickMAP mapfile into which the DLG data is being imported. The file with extension .OUT is a text file that contains the same information as is displayed on the screen during processing. Save it as a handy reference to the contents of your data file and how it was processed. The next five are binary files used to build the topology and may be of consequence only if a problem occurs during processing. The .ALL file is an area line list for map features related to imported mapIDs, .EXC is a list of codes or IDs excluded from either the DLG file or LUT (lookup table) file, .IDX is the imported mapIDs' index of features (points, lines, areas), .MBR is the imported arcs' index and minimum bounding rectangle, and .PTS contains a list of DLG point data (control points, nodes, area labels, and degenerate lines).

If a problem occurs while building the mapIDs (ie., after all the node, area, and line records have been processed but before completion), the DLG file can be reprocessed after corrections have been made. This case is automatically detected and when appropriate, a fourth option is added to the 'Build MapIDs' menu:

4) for intermediate dlq files

If chosen, option 4 will re-use the five binary files listed above and the arcs already imported into the mapfile during the previous run. This will save processing time. If no problems occur during a data conversion, and the ChkDLG, ChkArcs, ChkIDs and ChkSets results are good, the five intermediate binary files can be deleted to save space on your data directory.

Also during the processing, three temporary files used in building the mapID tables are written: TEMP.DLG, TEMP.EXC, and TEMP.IDX. These files are written over every time DLG2QM is run. They can be deleted after a run if you need to save space on your working or data directory.

DB2QM

DB2QM (for database to QuickMAP), is a customizable procedure provided with QuickMAP for importing point data from an arbitrary database manager and database into a QuickMAP mapfile. Use this procedure to associate selected records in a tabular database with a mapID in a QuickMAP mapfile. Once a procedure is developed and associations are made, the contents of a mapID may be updated based on your most recent query of the database.

The procedure is specified by a script, or text file, that contains keywords outlining the sequence of actions and supplying the file names and parameters to be used. At a minimum, the script must name:

- 1) the MAPFILE into which the data will be imported;
- 2) the REPORT file containing coordinates from the database in a MOSS Export Format;
and
- 3) the PROJECTION in which the report file coordinates are represented.

The DOS command line to invoke your database manager or application may also be included in the script for interactive report generation, provided that your database manager does not require too much of DOS conventional memory.

All possible script keywords are briefly described below. In the description, keywords are CAPITALIZED, parameters that define the content of the script are included in {curly brackets}, [square brackets] indicate statements or parameters that are optional, and vertical bars (|) indicate one of several choices for a particular parameter.

[REM {explanatory comment or documentation}]

[ECHO {message displayed on the screen}]

[PAUSE {message displayed while waiting for user to hit any key}]

[DOS {dos command line and arguments}]

MAPFILE {pathname of map file} [ARCNAME]

REPORT {pathname of database report file} [ITEMHEADER | ITEMCOUNT]

PROJECTION {type}

[PARAMETERS {value} [, value], ...]

[IMPORT {pathname of projection moss export file}]

[PROJECTION {type}]

[PARAMETERS {value} [[, value], ...]]

DBMS [{dos command line for a database manager or application program which creates the report file}]

The script must contain MAPFILE, REPORT, PROJECTION, and DBMS statements, in that order. Also, a PARAMETERS statement must follow any projection type for which it applies. DOS, ECHO, PAUSE, and REM statements may occur anywhere in the script.

The DBMS statement must follow the last PROJECT or PARAMETER statement. A database manager or application program of your choice may be run from QMUTIL with the DBMS statement if there is enough conventional memory to do so. (The QuickMAP utilities take about 128K as a DOS shell.) If you can't run your database manager as part of a script, you may run it prior to using QMUTIL and still provide a script for importing associated data.

Some database managers have only primitive file I/O facilities, or require programming that most users would rather avoid. Therefore, the ITEMHEADER parameter may be used in the REPORT statement to insert a MOSS Export File item header in front of the coordinates reported. Likewise, ITEMCOUNT may be used to update the report's item header to reflect the number of coordinates the report contains.

If a valid ARCNAME is provided in the MAPFILE statement, it is always inserted in the item header. Note that an ARCNAME must be supplied if ITEMHEADER is specified. For more details on the database report format see the section on MOSS Export File Format. For further flexibility in having a script interact with a database manager's application program, QuickMAP creates temporary DOS environmental variables (REPORT for the report file, and ARC for the arcname specified in the MAPFILE statement) when the DBMS statement is executed.

The IMPORT statement must be included if the database file coordinates are in a different projection system than the mapfile. IMPORT, when included, must be followed by the same PROJECTION and PARAMETERS statements that apply to the mapfile specified. Note that the file specified in the IMPORT statement (or the REPORT statement, if it is directly imported into the mapfile) must have the same projection as the mapfile. Otherwise the procedure will be aborted.

Valid projections with their identifying values and corresponding parameters are given below. Additional details are also explained in the section on the QuickMAP PROJECT utility.

- Geographic: Specified as GEOGRAPHIC or 0. This is not really a projection and has no parameters so no PARAMETERS statement should follow it.
- Universal Transverse Mercator: Specified as UTM or 1. It may be defined by either a single longitude (in either decimal degrees or degrees, minutes, and seconds) or a zone (i.e., PARAMETERS -105 and PARAMETERS ZONE 13 are equivalent).

- State Plane Coordinate Systems: Specified as STATEPLANE or 2. Its parameters are specified as a valid USGS code and units. For example, PARAMETERS USGS 3451 FEET indicates Colorado North coordinate system in feet. Alternately, units may be METERS.
- Albers Conical Equal Area: Specified as ALBERS or 3. Parameters are numeric values specified in order as north standard parallel, south standard parallel, central meridian, base latitude, false Easting and Northing. Latitudes and longitudes must be in decimal degrees, false Easting and Northing in meters.
- Lambert Conformal Conic: Specified as LAMBERT or 4. Parameters are as for Albers.
- Mercator: Specified as MERCATOR or 5. Parameters are numeric values specified in order as central meridian, latitude of true scale, false Easting and Northing. Latitudes and longitudes must be in decimal degrees, false Easting and Northing in meters.
- Polyconic: Specified as POLYCONIC or 5. Parameters are numeric values specified in order as central meridian, base latitude, false Easting and Northing. Latitudes and longitudes must be in decimal degrees, false Easting and Northing in meters.

There are several noteworthy differences in how MOSS Export files are handled by the utilities MOSS2QM and DB2QM. MOSS2QM is intended to be used when new information is imported into a mapfile, while DB2QM expects that existing mapfile information is being updated or replaced. Consequently, if an item already exists in the mapfile, MOSS2QM will prompt you to rename the imported item. DB2QM expects that item to exist as an arc and warns you if the arc either doesn't exist or is not yet associated with a mapID. If an arc does exist, DB2QM makes the update without your confirmation, so be sure the arc is specified correctly. Also, it is especially important to back up your mapfile before running QuickMAP utilities to prevent inadvertent data loss. Another difference between DB2QM and MOSS2QM is that DB2QM was designed to make updates one item at a time. Multiple items may be included in a report file but the ITEMHEADER, ITEMCOUNT, and ARCNAME parameters will not be supported and your application must generate a report which includes a correct item header for each item reported.

Using dBASE and QuickMAP for Manatee Mortality in Florida

An example of how to use the DB2QM process to import dBASE data into a QuickMAP mapfile follows. The necessary script and associated files are distributed with QuickMAP and are placed on your EXAMPLES subdirectory during installation. This example is based on the manatee mortality database representing locations of over 1000 carcasses recovered from 1978 through 1987, and contained in the dBASE III data file, SALVAGE.DBF. The dBASE III+ program, MORT.PRG, handles the dBASE manipulations to export data from the SALVAGE database. dBASE III+ must be installed on your machine and its directory included in your path before QMUTIL is started and the script DBSCRIPT.TXT is specified from DB2QM.

Begin by running QMUtil as described previously. Select the IMPORT/EXPORT option on the QMUtil Main Menu. Then select the third option, 'IMPORT Geographic coordinates from database files', from the second menu and the following will be displayed:

```

IMPORT MOSS Data into a QuickMAP Mapfile (MOSS2QM)
IMPORT DLG Data into a QuickMAP Mapfile (DLG2QM)
▶ IMPORT Geographic coordinates from database files (DB2QM)
EXPORT selected arcs in a MOSS Export Format (EXPORT1)
EXPORT selected families of arcs in a MOSS Export Format (EXPORTFA)

```

***** **DB2QM - Import Database Coordinates as Arcs** *****

Enter DB2QM Script File Name: C:\QMAP

The default path supplied is the one where the QuickMAP programs are installed. For this example, the script file is on the EXAMPLES subdirectory. Edit the default path to reflect this and enter the script file name, DBSCRIPT.TXT. A series of messages describing this DB2QM example will be sent to the screen by ECHO statements in the script. Then, the PAUSE statement in the script produces the message

Press any key to begin a query . . .

Your response to this request will continue processing of the script file, the contents of which are reproduced below.

Script DBSCRIPT.TXT

```

REM Sample script for querying the Manatee SALVAGE data base,
REM reporting latitude longitude values of selected records to a
REM file in Moss Export format, re-projecting to a Lambert projection,
REM and importing results into the FLORIDA map file. (by R.G.O. 1/5/93)
DOS C:
DOS CD \QMAP\EXAMPLES
ECHO
ECHO      Sample dBASE to QuickMAP Script
ECHO
ECHO This example uses the manatee mortality data base SALVAGE and
ECHO the FLORIDA mapfile. The dBASE program MORT.prg is used to
ECHO build a query, specifying only those locations of interest, and reports
ECHO them as lat/long to the moss export file MORT.LL.
ECHO
ECHO Results are then run through PROJECT, which converts coordinates
ECHO to Lambert and stores them in the file MORT.LAM. Finally, results
ECHO are imported into the mapfile by overwriting the SALVAGE1 arc,

ECHO which has already been preassembled in the FLORIDA mapfile as
ECHO the MORTALITY mapID.
ECHO

```

```
ECHO  HINT: To better understand the process and identify other problems
ECHO      you might encounter, check the log file SCRIPT.OUT.
ECHO
PAUSE  Press any key to begin a query...
ECHO
MAPFILE C:\QMAP\EXAMPLES\FLORIDA SALVAGE1
REPORT C:\QMAP\EXAMPLES\MORT.LL ITEMCOUNT
PROJECTION GEOGRAPHIC
IMPORT C:\QMAP\EXAMPLES\MORT.LAM
PROJECTION LAMBERT
PARAMETERS 33,45,-96,20,5000000,0
DBMS DBASE MORT
ECHO
ECHO  Use the MORTALITY mapID in the FLORIDA mapfile to display these
ECHO  locations.
ECHO
```

As mentioned above, the script identifies the MAPFILE (FLORIDA), ARCNAME (SALVAGE1), and PROJECTION (GEOGRAPHIC, for which no PARAMETERS are required). An IMPORT statement, followed by PROJECTION and appropriate PARAMETERS for Lambert provide for the reprojection of the Geographic coordinates from the dBASE file into the mapfile, which is in the Lambert Conformal Conic projection. Finally, the DBMS statement identifies the dBASE program MORT.

The details of the database manipulations are handled in the dBASE III+ program, MORT.prg, listed below. Note the use of DOS environmental variables to pass the script's report file name and mapfile arc name for use in the report's item header.

```
* Program.: MORT.PRG
* Author...: R.G.Osborn
* Date....: 3/16/89; modified for sample dbf and script file 12/21/92
* Notes...: Demonstrates the transfer of carcass salvage locations
*           from the manatee mortality data base to QuickMAP

* Initialize memory variables
reportfile=GetEnv("REPORT")
arcname=GetEnv("ARC")
item=1
points=0

* Open data base
USE Salvage

* Create or modify query (if not saved, all records will be used)
CLEAR
CREATE QUERY MORT.QRY
* Display credits
```

```
CLEAR
@0,4 TO 15,75 DOUBLE
@6,5 TO 6,74
@1,22 SAY SAY "dBASE to QuickMAP Conversion Utility"
@3,31 SAY "Data base is SALVAGE"
@5,21 SAY "Manatee Mortality Locations and Causes"

* Locate first record that meets query
@8,11 SAY "Searching data base ..."
SET TALK OFF
GOTO TOP

* Output results
IF EOF()
  @11,21 SAY "No locations found!"
  SET CONSOLE OFF

RUN DEL &reportfile
SET CONSOLE ON
QUIT
ENDIF
@9,11 SAY "Writing coordinates ..."

* Open output file
SET CONSOLE OFF
SET ALTERNATE TO &reportfile
SET ALTERNATE ON

* Write item header in MOSS Export Format
?? STR(item,5) + SPACE(10) + arcname + SPACE(25) + STR(points,5)

* Write coordinates in MOSS Export Format
DO WHILE .NOT. EOF()
  STORE points + 1 TO points
  STORE (-1.*(LONGDEG+LONGMIN/60.+LONGSEC/3600.)) TO ddlong
  STORE LATDEG+LATMIN/60.+LATSEC/3600. TO ddlat
  ? STR(ddlong,10,5) + STR(ddlat,10,5)
  SKIP
ENDDO
?

* Close output file
SET ALTERNATE OFF
CLOSE ALTERNATE
SET CONSOLE ON
SET TALK ON

* Report number transferred
@11,11 SAY "STR(points,5) + " locations reported to " + reportfile
QUIT
```


When the MORT program is started, dBASE is loaded and a copyright notice is displayed; press <Enter> to continue. An informational screen about DB2QM will be displayed; again press <Enter> after reading it.

The next screen will be a dBASE query form, which will allow you to ask the database for data satisfying specific criteria. Study the query form briefly if you are not familiar with dBASE. You can move around the screen and modify the query form using the arrow keys, the <Enter> key, and limited typing.

Set Filter	Nest	Display	Exit	09:04:09 am
-------------------	-------------	----------------	-------------	--------------------

Field Name				
Operator				
Constant/Expression				
Connect				
Line Number	1			

Line	Field	Operator	Constant/Expression	Connect
1				
2				
3				
4				
5				
6				
7				

CREATE QUERY	 <C: MORT.QRY	 Opt:1/2	 	 Num
---------------------	----------------------------	-------------------	-----------	---------------

Position selection bar- ↓↑ Select- ←┐ Leave menu- ←→
Select a field name for the filter condition.

Across the top of the display are the names of four operations: 'Set Filter', 'Nest', 'Display', and 'Exit'. You can move back and forth between the items using the left and right arrow keys. For now, leave 'Set Filter' in the top line selected (highlighted in reverse video); this operation is to set the conditions needed to "filter", or select, the data you want from the database. By modifying and/or adding to the query form, you can select very specific sets of data. As a simple example, we will set the filter to select salvage data reported during a certain year.

The top window is used to set or modify a specific condition to build the query table logic shown in the lower half of the screen. Note that this window links to a specific line in the filter table. Currently, the link is to line 1 and 'Field Name' is highlighted.

To view a list of all available field names for the SALVAGE database, press <Enter>. A list appears to the right of the table (illustrated below.) Using the upward and downward arrow keys, move the highlight bar until it is located over "RECYEAR" in the list. Note that when a field name is highlighted in the list, a descriptive panel appears below the top table. (In the illustration, the arrow on the left points to the panel.) This panel gives the field name and name of the database to which it belongs, and the type and size of data values defined for the field. In this case: 'SALVAGE - RECYEAR' means that 'RECYEAR' is a field name in database 'SALVAGE', data type is 'Numeric' and may be 2 digits long with no decimal places (ie., must be whole numbers).

Set Filter		Nest		Display		Exit		09:04:09 am	
Field Name Operator Constant/Expression Connect <hr/> Line Number 1					FIELDID SEX LENGTH RECYEAR RECMONTH RECDAY STATE COUNTY LATDEG LATMIN LATSEC LONGDEG LONGMIN LONGSEC CONDCODE DTHCODE				
Field Name Type Width Decimal a SALVAGE → RECYEAR Numeric 2 0					Connect 				
3 4 5 6 7									
CREATE QUERY <C: MORT.QRY Opt:4/16 Num									
Position selection bar- ↓↑ Select- ◀ Leave menu- ◀→ Select a field name for the filter condition.									

Notice, also, the instructions at the bottom of the display. The bottom line gives specific instructions for whatever is currently highlighted on the screen. For example, with 'Field Name' highlighted in the top table, the bottom line reads 'Select a field name for the filter condition'. The instructions at the bottom will change when the highlight bar is moved to another operation or item.

Select RECYEAR by pressing <Enter> while the field name is highlighted. When you select a new field name, the list of field names disappears, the new name is entered in both the upper table and the query form, and the highlight bar moves to the next operation in the top table.

In a similar fashion, you may alter any of the filter conditions. 'Operator' is now highlighted in the top table. Press <Enter> to display a list of possible operators, and from the list select 'Equals'.

=	Equals
>	More than
>=	More than or equals
<	Less than
<=	Less than or equals
<>	Not equal to

Now you are ready to set the 'Constant/Expression' condition of the filter. The reverse video bar automatically moved to highlight 'Constant/Expression' when you completed your selection of 'Equals'.

Type "78" and press <Enter> to select all data that was reported in the year 1978. We knew to enter only "78", instead of "1978", because the descriptive panel about this field defined numeric data only 2 digits long (see above). If you make a mistake while entering the 'Constant/Expression' information, you can edit using the backspace, delete and arrow keys as they are used elsewhere in QuickMAP.

Next the highlight bar moves down to 'Connect' on the top table. This would be used to add other conditions to the filter if needed. For example, you could include conditions to select all 1978 data reported in a certain county or within an area defined by certain latitude and longitude values. Press <Enter> to see a list of 'Connect' options and select 'No combination'. We are finished setting the filter for the current example, and do not need to 'Connect' any additional query conditions. The query table should now look like the illustration below.

Field Name	RECYEAR
Operator	Equals
Constant/Expression	78
Connect	
Line Number	1

Line	Field	Operator	Constant/Expression	Connect
1	RECYEAR	Equals	78	
2				
3				
4				
5				
6				
7				

When the query table is satisfactorily completed, you may proceed to filter the database for the desired data. First, use the right arrow key to move

the highlight bar in the top line of the display to 'Exit'. A menu will appear with the options 'Save' and 'Abandon'. If you select 'Save', your query will be saved in a file named "MORT.QRY", as instructed in the MORT.PRG dBASE program. The conditions will be used to filter the database. If 'Abandon' is selected, your query will be abandoned and the default query will be used to filter the database. Since there is currently no default query, the entire SALVAGE database would be reported out and imported into QuickMAP. Note that only valid queries may be saved. If an invalid one is constructed, dBASE sounds a bell and you can locate and correct the error. Also, once the MORT.QRY is saved, it will become the new default.

Select 'Save'. The DB2QM introductory screen will replace the query screen and the message *Searching database...* will be displayed. The amount of time required to select out the appropriate data will vary depending on the size of the database. Next, the message *Writing coordinates...* will appear. As they are located, the record numbers of the coordinates are shown on the command line near the bottom of the screen.

In this case, the first one shown will be 20/979, meaning "record number 20 out of a total of 979 records in the database."

When the entire database has been searched and the coordinates written to a file, the dBASE screen will disappear and the following messages will be displayed:

```
*** END RUN dBASE III PLUS  
Report file reprojected  
Loading 75 coordinates into arc SALVAGE 1  
Arc associated with mapID(s) MORTALITY  
Finished processing map file C:\QMAP\EXAMPLES\FLORIDA
```

Use the MORTALITY mapID in the FLORIDA mapfile to display these locations.

This part of the program has reprojected the data coordinates and imported them into the QuickMAP database named FLORIDA, on the \QMAP\EXAMPLES directory. The data have been entered into a mapID named "MORTALITY", containing a single arc named "SALVAGE1". All of this was specified in the script file DBSCRIPT.TXT. While importing the data, DB2QM overwrote a previously existing SALVAGE1 arc that was associated with mapID MORTALITY. If the arc name specified in the script file does not exist in the specified QuickMAP database, a new arc by that name will be created for the data, but the new arc will not be associated with any mapID.

When the process is finished, you will be returned to the QMUtil Main Menu.

SALVAGE dBASE File

As mentioned in the preceeding section, the SALVAGE dBASE file contains point data representing carcass salvage locations from the manatee mortality database. As you work with DB2QM, some additional information about the SALVAGE data might be helpful. The table below lists selected field names in the database, along with the length and type of data allowable for each field and a brief description of the field contents.

The time period spanned by the 'Recorded' field is January, 1974 through February, 1987. (More recent data is available from the Florida Department of Natural Resources.)

Field Name	Data Type	Data Length	Description of Field Contents
FieldID	Char	9	Specimen ID
Sex	Char	1	Sex of specimen (M,F,J)
Length	Num	5.1	Length in CM
RecYear	Num	2	Year Recovered
RecMonth	Num	2	Month Recovered
RecDay	Num	2	Day Recovered
State	Char	2	State of salvage
County	Char	15	County of salvage
LatDeg	Num	2	Latitude in Degrees
LatMin	Num	2	Latitude in Minutes
LatSec	Num	2	Latitude in Seconds
LongDeg	Num	2	Longitude in Degrees
LongMin	Num	2	Longitude in Minutes
LongSec	Num	2	Longitude in Seconds
ConCode	Char	1	Condition when recovered *
DthCode	Char	1	Death Category **

* CondCodes: 1 - Alive

2 - Fresh

3 - Moderately decomposed

4 - Badly decomposed

5 - Dried carcass/bones

** DthCodes: 1 - Boat/Barge collision

2 - Crushed/drowned in flood gate

3 - Other human-related cause

4 - Dependent calf

5 - Undetermined

6 - Other/natural

Using RBase with QuickMap

The RBase for DOS database management program can be used in conjunction with QuickMap to store data and export that data to QuickMap in a form that can be easily read into a QuickMap database. Typically, RBase requires too much conventional memory to be run as part of the script file. For this reason, RBase users may have to generate their reports prior to using QMUTIL and DB2QM. The following procedure outlines most of the considerations to use RBase in conjunction with DB2QM.

The data table in RBase which is used to store the descriptive data of interest should also contain the longitude and latitude coordinates and the decimal degrees equivalents of those coordinates. The longitude and latitude coordinates can be stored by one of three methods. Method one is to store the degrees, minutes, and seconds as separate integer data fields or columns. Method two is to store the degrees, minutes and seconds as a single integer number. The last method is to store the data as a six digit string of text. Each method is discussed below but we suggest that method one be used for its ease of use and simplified automatic data checking. Data export is accomplished by using an RBase report to write data out to a file which is then processed by the DB2QM utility into the desired QuickMap database.

Storing data as separate fields

When data is stored as separate integer fields, the RBase data table must contain eight columns for the location information. The degrees, minutes, and seconds each requires a separate column for the longitude coordinates and the latitude coordinates, thus making a total of six columns. Columns also would be needed for the decimal degrees longitude and for the decimal degrees latitude. The decimal degree columns will be computed, double precision columns; therefore, they must appear in the data table after the first six coordinate columns. The coordinates columns should be assigned as integer data types and must precede the computed decimal degree columns in the data table. It is strongly suggested that the coordinate columns be located together in the data table and that the following conventions be used to name the individual columns.

<u>Column Name</u>	<u>Data stored in the column</u>
lond	degrees of longitude for the data being stored
lonm	minutes of longitude for the data being stored
lons	seconds of longitude for the data being stored
latd	degrees of latitude for the data being stored
latm	minutes of latitude for the data being stored
lats	seconds of latitude for the data being stored

The two columns used to store the decimal degree equivalents of the longitude and latitude should be declared as double precision data types, and it is suggested that the following names and formulae be used to create the columns.

<u>Column</u>	<u>Data</u>	<u>Type</u>	<u>Formula</u>
ddlon	Longitude	real	$(-1 * ('lond' + ('lonm' / 60) + ('lons' / 3600)))$
ddlat	Latitude	real	$('latd' + ('latm' / 60) + ('lats' / 3600))$

Assuming the above configuration is utilized, the typical RBase data table might appear as follows:

...	lond	lonm	lons	latd	latm	lats	...	ddlon	ddlat
	integer	integer	integer	integer	integer	integer		+double	+double

Notice that other data of interest may be stored anywhere in the table, as indicated by the ellipses, but we have kept the longitude and latitude coordinates together in the table and they appear prior to the computed columns which store the decimal degree data. The computed columns are marked with a "+" sign indicating they are computed columns and they have been declared to store double precision numbers. Data checking can be easily implemented by establishing data entry rules for the degrees, minutes and seconds columns. For example, a rule might be established that does not allow entry of greater than 59 for minutes and seconds. Please consult your RBase manual for more information on rule preparation.

Storing data as a single integer field

Location information may be stored in the RBase data table as two integer fields. In this instance, a single column would contain the longitude coordinates and another column would contain the latitude coordinates. Again, the table must have two double precision columns which will be used to store the decimal degree equivalents of the longitude and latitude columns. Since the degree, minute, and second information is stored together as a single number, the decimal degrees columns must be filled using an RBase program named CNVT2DD.CMD rather than being computed columns. Since these columns are not being calculated, they do not need to appear in the data table after the longitude and latitude columns. However, it is more logical and convenient to do so, and also to keep all the columns together. The RBase data design might appear as:

...	Long	Lat	...	ddlon	ddlat	...
	integer	integer		double	double	

Notice that the location data are kept together and that names that made sense were used. Also notice that the decimal degrees columns (ddlon and ddlat) were named the same as in the 'separate data fields' example. Data entry rules for data checking purposes may not be as easy to implement

using this single field storage scheme. You must assure that six numbers are entered for each coordinate and that minutes and seconds do not exceed 59. For example, you might use a rule that longitude data must be greater than 750000 and less than 950000, but a value of 856175 would pass the rule but still be an invalid location.

Storing data as a text field

Location information may be stored as text or string data in the RBase data table. Again separate columns would be used for longitude and latitude. Additionally, two double precision columns would be needed to store the decimal degrees values. This setup would be essentially identical to storing the longitude and latitude as single integer values, but in this case the initial data would be defined as textual data. The RBase data table might appear as:

...	Long	Lat	...	ddlon	ddlat	...
	Text 6	Text 6		double	double	

Notice the similarity to the previous example. The only difference is that the data columns for longitude and latitude have the text designation and are limited to a length of 6 characters. You must insure that all six digits of the coordinates are entered for each column. Again, the program CNVT2DD.CMD must be used to compute the decimal degree data.

Reporting Data in a MOSS Export File Format

Exporting data from the RBase data table to QuickMap is accomplished by using an RBase report to write the desired data to a file for processing into QuickMap. The DB2QM utility requires that the point data be in decimal degrees format. The "Reports Express" module of RBase would be used to set up the report format. When using "Reports Express" you are required to name the report ("DDOUT" might be a good name), as well as the table from which the data will be printed. The report would contain a header line followed by the data in longitude - latitude order. The report format might appear in the "Reports Express" layout as:

	1		2		3		4		5		6		7
1234567890123456789012345678901234567890123456789012345678901234567890													
RH 1			EAGLE1										
DS .	E	S	.	E									

Here the header line is 55 characters long and ends with a period. (Use ITEMCOUNT in the script file to insert the correct number of coordinates reported.) The first data field is for longitude, the data column named "ddlon". The period in the fifth position is a decimal mask that assures that 5 characters follow the decimal point. The second data field is separated by one space from the first and would be for the latitude decimal degree column named "ddlat". In the report

configuration, make sure that the option for "Remove Initial Carriage Return" is set to "yes" and the lines per page is set to "0" (zero).

Once the report is defined as above, it may be used to write data to a file for import into a QuickMap database. This would typically be done using three RBase commands: "output", "print", and "output". The initial output command tells RBase to route all following data to a specified file name. The print command writes the data to that file, and names a report that specifies the format to be used. The last output command closes the file properly. Following is an example of a command sequence:

output eagle.ll

print ddout where state eq florida and eggs ge 3 and chicks gt 1

output screen

Assume you had a database of eagle nesting locations in the Southeast U.S. The commands above would write the coordinates of eagle nests in the state of Florida, where the number of eggs laid were greater than or equal to 3 and the number of chicks fledged were greater than one. The first command tells RBase to open a file called "eagle.dat" to receive data. The second command will print data to the open file in the format specified in the report named "ddout". This would be the decimal degrees data, filtered to meet specific conditions described in the "where" clause. The last command closes the file properly. The "where" clause can be anything that produces a discrete data set for inclusion into a QuickMap database.

Finally, use DB2QM with the following script to import the coordinates into the EAGLE mapID in the FLORIDA mapfile.

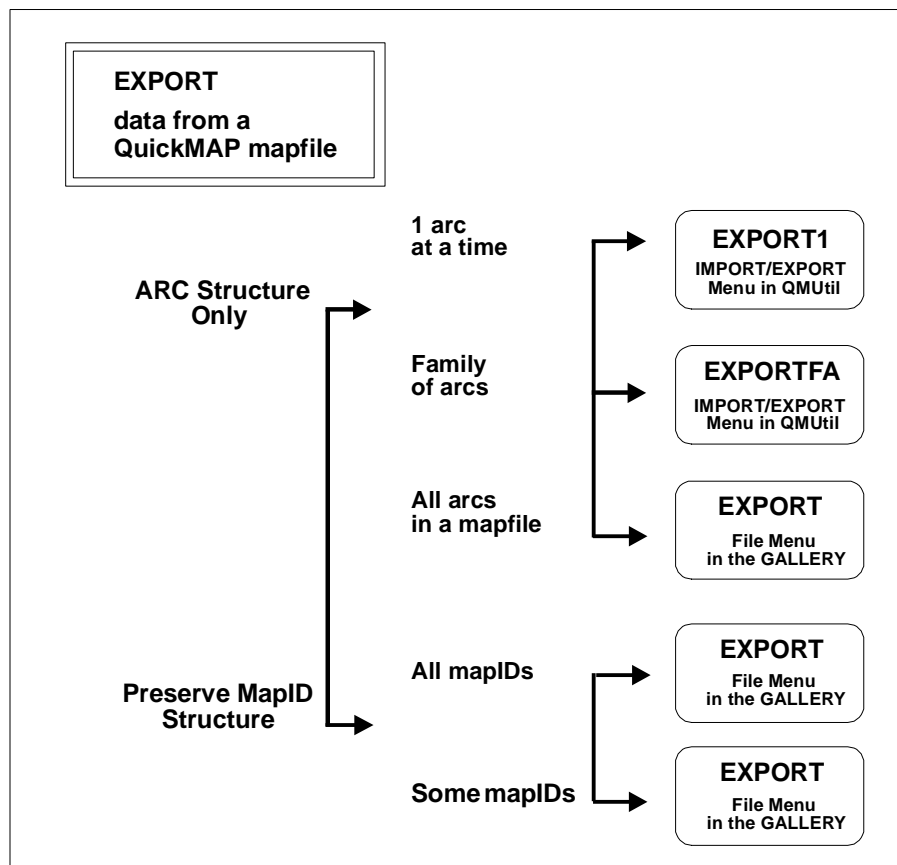
```
MAPFILE FLORIDA
REPORT EAGLE.LL ITEMCOUNT
PROJECTION GEOGRAPHIC
IMPORT EAGLE.LAM
PROJECTION LAMBERT
PARAMETERS 33,45,-96,20,5000000,0
DBMS
```

Data Export Utilities

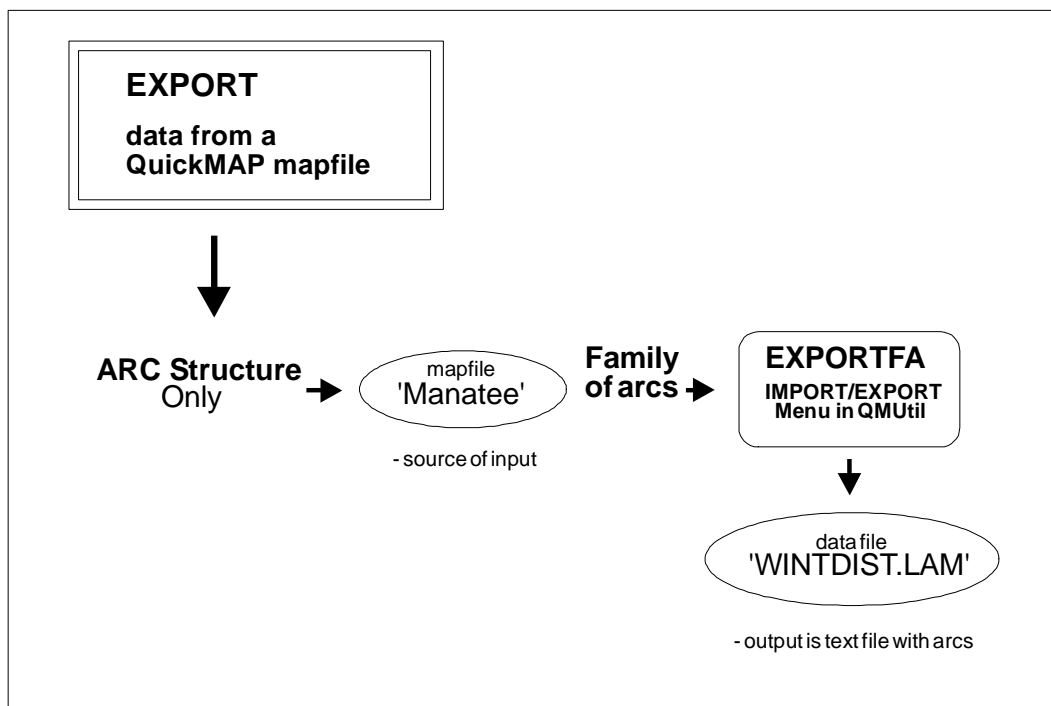
Included in the QuickMAP package are some utility programs used to export data from a QuickMAP database (or mapfile). As illustrated in the chart below, the method of accessing an Export utility depends on the specific results needed. QMUtil's IMPORT/EXPORT menu offers two options for exporting data: to export 1 arc at a time, choose EXPORT1, which is the fourth option in the IMPORT/EXPORT menu; to export a family of arcs, use EXPORTFA, the fifth option. In addition, three export options are offered by the 'File' Menu in QuickMAP's

GALLERY. You may choose to export all the arcs in a mapfile, or if you are interested in preserving the arcs' organization into mapIDs, you may choose to export the arcs in some or all mapIDs in the mapfile.

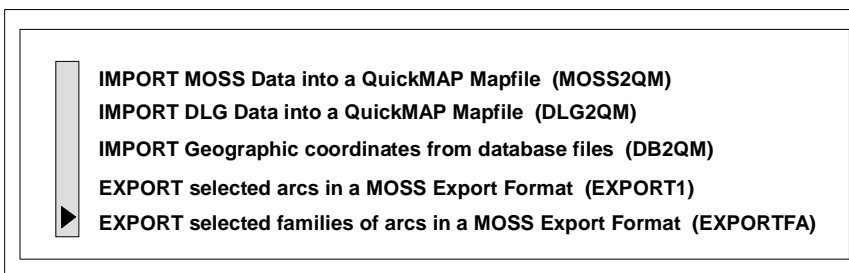
The combination of Export utilities with others described in the sections 'Control Points', 'Changing Data Projection Systems', and 'Data Import Utilities', offers multiple options for entering, rearranging and recombining data from various sources to make "custom mapfiles."



To illustrate the use of the Export utilities, suppose you wish to make a new database (mapfile) that contains only data representing the winter distribution of manatees in a certain study area in Florida. In the MANATEE database, there is a mapID called 'Winterdist' that consists of the desired data. All that is needed is to export the 'Wint' family of arcs from the 'Manatee' mapfile. Then the arcs can be imported back into a newly created mapfile, using the MOSS2QM utility. To export a family of arcs, use the utility ExportFA, which is accessed via the IMPORT/EXPORT menu in QMUtil. The pathway is illustrated below.



Start by running QMUtil as described previously. (Enter QMUTIL at the DOS prompt while in the QMAP directory.) Select the IMPORT/EXPORT option from the QMUtil Main Menu. Then select 'EXPORT selected families of arcs in a MOSS Export Format' from the IMPORT/EXPORT menu.



The screen will be cleared and a message will be displayed:

Export Arc Coordinate Data Utility
Export Arcs from Map: C:\QMAP

Enter:

EXAMPLES\MANATEE

Or enter the name of any QuickMAP database. The MANATEE mapfile, or database, was installed with QuickMAP if you selected sample mapfile inclusion during setup.

Next, the computer displays:

Export Coordinates to text file:

The path previously specified for the mapfile will automatically be entered as a default. Use the right arrow key to move the cursor to the end of the path and delete MANATEE. Then enter:

WINTDIST.LAM

(You can name the text file any acceptable DOS filename. We used WINTDIST.LAM to remind us of the data the file will contain - **w**inter **d**istribution of manatees. The .LAM extension indicates that data coming from the Manatee mapfile are in the **LAM**bert Conformal Conic projection.)

ExportFA next displays:

Export Family?

Enter:

WINT

(Remember that the family name is the “first part” of an arc name, without the trailing number that identifies the individual arc.)

***Enter 0 = Maintain arcnumbers as in mapfile
1 = sequential arcnumbers***

A brief explanation of how the arc numbers will be derived is given at the end of this section. Meantime, enter 1. There will be a pause while the arcs are processed. Then:

21 arcs exported to WINTDIST.LAM

(Had you been using the Export1 option, you would have been prompted to enter the name of a single arc to be exported. You could enter "WINT1", for example. The prompt for a single arc is repeated until the user terminates the program by pressing <Enter> without first entering an arc name. So, as many single arcs as desired can be written to the text file created by Export1.)

When the arcs have been exported and the data written to a text file, you will be prompted to choose:

More Utilities? Y

Accepting the default "Y" will return you to the IMPORT/EXPORT menu. Answering "N" will exit QMUtil and return you to the DOS prompt.

The WINTDIST.LAM file contains 21 WINT arcs in a MOSS Export format. The file may now be reprojected, if necessary, and then imported into another QuickMAP mapfile.

How the Export Utilities Derive Arc Numbers

To better understand what "sequential" versus "maintained as in mapfile" means in regard to arc numbers, it helps to look at the data file produced by ExportFA in the above example. Below is an illustration of how the last six arcs are listed in the WINTDIST.LAM file.

16	WINT16	1
6568315.00	982584.25	
17	WINT17	1
6537442.50	1024154.06	
18	WINT21	1
6562409.50	986481.75	
19	WINT26	1
6559235.50	993436.69	
20	WINT27	1
6535574.50	10234085.81	
21	WINT37	1
6554941.00	1004376.69	

In the first line, the "16" is the arc number assigned by the ExportFA program. "WINT16" is the original arc name in the Manatee mapfile. The "1" to the right is the number of coordinate pairs in the "WINT16" arc. The next line (6568315.00 and 982584.25) shows the actual coordinate pair comprising "WINT16".

As you read down through the remaining arc data, note that after "WINT17", the arc numbers assigned by ExportFA no longer agree with the original mapfile arc numbers. This is because we asked ExportFA to assign sequential numbers. Had we picked "0 = Maintain arcnumbers as in mapfile", the numbers assigned by ExportFA would all match those from the original mapfile.

When the MOSS2QM utility is used to import the "WINTERDIST" family of arcs back into QuickMAP to make a new mapfile, the arc numbers are derived in the following manner. MOSS2QM takes the arc name (eg., "WINT21"), removes the trailing number (to give "WINT"), and appends the arc number supplied by ExportFA (in this case, "18"). The resulting arc name in the new mapfile would be "WINT18". So in the new mapfile, the arcs would be sequentially numbered. Each time Export is run, the user must decide whether he wants to preserve the arc numbering as in the old mapfile or have the arcs sequentially numbered when they are imported back into a new QuickMAP database.

Examining Data and File Structures Used by QuickMAP

Checking MOSS Export Files

QuickMAP's CHKMOSS utility provides several options for checking a MOSS export file. The entire file may be checked, or the user may select a portion of the file delimited by attribute names, item numbers, or byte addresses. Three options for file summaries are offered, or a selected portion may be extracted into a separate file. Results may be sent to the screen, printer or a disk file.

Begin by running QMUtil as described previously. Select the EXAMINE option on the Main Menu.

▶ **IMPORT** data into and **EXPORT** data from QuickMAP
 ▶ **EXAMINE** Data and File Structures used by QuickMAP
 ▶ **MODIFY** Contents of QuickMAP File Structures
 ▶ **ENTER** Geographic Controls and **CHANGE** Projections

▶ **CHECK** a MOSS Export File and Summarize the Contents (CHKMOSS)
 ▶ **CHECK** a DLG-3 Optional File and Summarize the Contents (CHKDLG)
 ▶ **CHECK** a Mapfile's Arc Index against its Arc Coordinate Records (CHKARCS)
 ▶ **CHECK** a Mapfile's MapID Index against the MapID Table Records (CHKIDS)
 ▶ **CHECK** a MapID's Table Structure (CHKSETS)
 ▶ **AUDIT** a Mapfile's MapIDs and Arcs (AUDIT)
 ▶ **DUMP** a Mapfile's data structures (DUMPMAPF)

Then select the first option, 'CHECK a MOSS Export File and Summarize its Contents (CHKMOSS)', from the EXAMINE menu.

The screen will be cleared and the following will be displayed:

CHKMOSS Utility to Scan a MOSS Export File

Enter MOSS Export File Name:

The path to your QMAP directory will be entered automatically as a default. Edit it as necessary to reflect the full path name (drive:\directory\filename) for the file to be checked.

Scanning a whole file

Next, the program asks:

Do you want to examine the entire file ([Y]/N)?

You may enter "Y" (the default) to have the entire file scanned, or "N" if you wish to specify only a certain portion of the file. If you select "Y", the following will be displayed:

Select display option

- 1) **File summary only**
- 2) **Attribute Table**
- 3) **Set Table (identifies holes as separate sets)**
- 4) **Coordinate Dump**

?2

(The "2" after the question mark means that the default selection is number 2.)

Selecting option 1 will produce an overall summary of scanned data which documents the file's name, size, and creation date; the first item record in the file and the coordinate format used (eg., "decimal degrees" or "UTM"); the total number of attributes, items, and coordinates scanned; and the minimum bounding rectangle of all coordinates scanned. An example of such a file summary is shown below. The same file summary is also included with the report produced by selecting any of the other 3 options.

File Summary

-produced by running CHKMOSS option 1 on the sample MOSS export file

CHKMOSS Utility to Scan a MOSS Export File

File = TESTMAP.UTM Size = 2191 bytes
Created 5/30/91 7:19:36

First Item in file begins on line 1. It is:
148 SWDITCH 10

Coordinate Format is 11F2 e.g. (3087551.10 1227017.28)
Probably UTM coordinates (meters).

Totals after scanning 84 lines of text
and checking data through Item 166.

Attributes = 3	Items = 6	Coordinates = 77
Sets = 7	Points = 4	Lines = 1
	Outlines = 1	Holes = 1

Minimum bounding rectangle is 3085864.36 1225792.43 3088111.61 1227249.18

Option 2, 'Attribute Table' lists attribute name (up to 30 characters long); the file address or byte position where the first item of each attribute is found; the number of sets for each attribute, the total number of coordinates for each attribute, and the minimum bounding rectangle for the sets comprising each attribute. This table may be edited and subsequently used with the MOSS2QM

utility to specify which attributes will be imported into a QuickMAP mapfile. The 'Attribute Table' reported by option 2 for the sample MOSS export file is shown below.

Attribute Table

- produced by running CHKMOSS option 2 on the sample MOSS export file

Attribute Name	File	# of	# of	Minimum Bounding Rectangle			
	Addr.	Sets	Coord	Xmin	Ymin	Xmax	Ymax
SWDITCH	0	1	10	3087551.10	1227017.28	3087645.17	1227249.18
SWWELL	297	4	8	3086066.15	1225792.43	3086066.15	1225792.43
SWPONDS	717	2	59	3085864.36	1226313.89	3086175.43	1226521.44

The 'Set Table' produced by selecting option 3 is comparable to that listed for the 'Attribute Table', except the information is referenced to sets, so a number and type (point, line, polygon, or hole) is given for each set. Here, the outline and holes comprising a polygon are treated separately. The 'Set Table' is useful to identify the type of feature each item represents and evaluate how much effort will be required to assemble attribute topology in QuickMAP. The information on 'File Address' can be used to delimit a portion of a file to be scanned by CHKMOSS (see 'Scanning a portion of a file', below). A 'Set Table' for the sample MOSS export file is shown below.

Set Table

- produced by running CHKMOSS option 3 on the sample MOSS export file

Attribute Name	Set		File	# of	Minimum Bounding Rectangle			
	No.	Type	Addr.	Coord	Xmin	Ymin	Xmax	Ymax
SWDITCH	1	L	0	10	3087551.10	1227017.28	3087645.17	1227249.18
SWWELL	1	P	297	2	3088111.61	1227228.63	3088111.61	1227228.63
SWWELL	2	P	402	2	3087904.14	1226347.63	3087904.14	1226347.63
SWWELL	3	P	507	2	3086464.92	1226107.70	3086464.92	1226107.70
SWWELL	4	P	612	2	3086066.15	1225792.43	3086066.15	1225792.43
SWPONDS	1	O	717	43	3085864.36	1226313.89	3086175.43	1226521.44
SWPONDS	2	H	1806	16	3085980.05	1226399.61	3086025.37	1226439.98

The 'Coordinate Dump' option sends an item summary table to the screen and extracts scanned data to a separate file. It also filters out invalid coordinate data and corrects the coordinate count in the appropriate item header. This option is useful for dividing large files into more manageable

subunits for editing, and for selective importing of portions of large MOSS export files into QuickMAP.

Several types of data verification are performed as files are scanned. Errors are reported when: an invalid item header or an invalid coordinate line is encountered; the number of valid coordinates in an item does not match the number listed in the item header; and when a hole set appears to be outside its outline set. Warnings are reported when: the file begins with something other than a valid item header; the coordinate format is different from MOSS export standards; the number of coordinates in a set exceeds the maximum editable in a QuickMAP arc; and when an outline or hole is not closed or contains less than three coordinates.

After you have selected one of the four report options, the following will be displayed:

Send output to:

- 1) Screen**
- 2) Printer**
- 3) Disk**

? 1

If '1) Screen' is chosen and the report is too long to fit on one screen, the information will probably scroll across the screen too fast to read. If you choose '2) Printer', be sure that your printer is on line and ready to print. If '3) Disk' is chosen, the following prompts will appear:

A summary file called filename.SUM will be created

(The default path and name of the MOSS export file being examined, but with the extension .SUM, will be provided automatically.) Then,

Enter OUTPUT File Name:

The same default path and filename with extension .CKM will be entered. You may edit the path and filename if desired. Next, you will be asked to:

Select option used to mark holes in polygons:

- 1) Negative X coordinate value**
- 2) Non-zero value in trailing field**

See the section on MOSS Export Format earlier in this chapter for an explanation of hole marking for different projections. After an option is chosen, the computer will work briefly, and two files will be written. The first file, with the extension .SUM, will contain the MOSS export file summary. The other file will contain the Attribute Table, Set Table, or Coordinate Dump you requested and will be given the extension .CKM. The file summary will also be listed to the screen.

Then you will be asked:

More Utilities?

Answering "Y" will return you to the EXAMINE menu of QMUtil; "N" will exit QMUtil and return you to DOS.

Scanning a portion of a file

If you answer "N" to the question at the beginning of the program, 'Do you want to examine the entire file?', a list of options will be displayed:

File position will be specified by:

- 1) Attribute Name***
- 2) Item Number***
- 3) File (Byte) Position***

1?

When any of the three options is selected, further messages will ask you to specify beginning and ending points (in terms of attribute name, item number, or file position) that delimit the portion of the file you want scanned. As an example of how to use options 1 or 2, refer to the sample MOSS export file and discussion in the section of this chapter entitled "MOSS Export Format" (under "Formats Supported by QuickMAP"). The Attribute Name field consists of character positions 16 through 45 in each header line. In the example, you might specify a portion of the file by entering "SWWELL" for both the beginning and ending attribute names. Only the part of the file containing the four sets with "SWWELL" in the Attribute Name field would be scanned. The same result could be obtained by selecting option '2) Item Number' and specifying "149" and "152" as the beginning and ending Item Numbers. The Item Number field occupies character positions 1 through 5 in the header line of a MOSS export file.

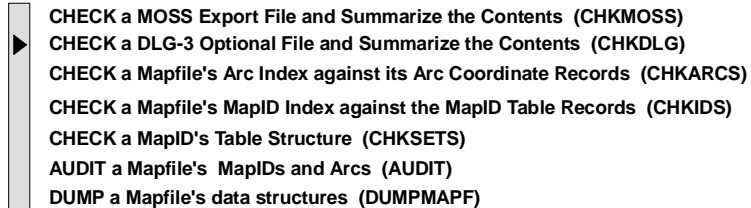
To use option 3, you need a listing of File Positions for the items. You can obtain this by running option '3) Set Table' in the display option list discussed above in the section "Scanning a whole file". Refer to the Set Table illustrated earlier in this section. The third column gives the starting file address for each set. To specify the "SWWELL" portion of the file, you would enter "297" and some number slightly beyond "612" (eg., "620") for the beginning and ending File Positions.

After you have specified the beginning and ending points for the scan, the list of four display options described above for scanning the entire file will be presented. The rest of the procedure will also be the same as described in the previous section, except results will be reported only for the portion of the file you have specified.

Checking DLG-3 Files

CHKDLG is a QuickMAP utility that produces a summary report of the contents of a DLG-3 file (Digital Line Graph optional format with level 3 topology). It may be used to check the integrity of a file before importing the data into a QuickMAP mapfile using DLG2QM.

To begin, run QMUtil from the DOS prompt and select option 2, 'EXAMINE Data and File Structures used by QuickMAP' from the Main Menu. Then select the second option, 'CHECK a DLG-3 Optional File and Summarize its Contents', from the EXAMINE menu. The screen will be cleared and the following messages will be displayed.



```
▶ CHECK a MOSS Export File and Summarize the Contents (CHKMOSS)
  CHECK a DLG-3 Optional File and Summarize the Contents (CHKDLG)
  CHECK a Mapfile's Arc Index against its Arc Coordinate Records (CHKARCS)
  CHECK a Mapfile's MapID Index against the MapID Table Records (CHKIDS)
  CHECK a MapID's Table Structure (CHKSETS)
  AUDIT a Mapfile's MapIDs and Arcs (AUDIT)
  DUMP a Mapfile's data structures (DUMPMAPF)
```

```
*****          CHKDLG - Utility to CHECK          *****
*****          a Digital Line Graph 3 Optional File *****
```

Enter DLG filename:

The path to your QMAP directory will automatically be entered as a default. You may use the QuickMAP edit keys to correct the path if necessary and to add the name of the DLG file to be checked. Be sure to include the .DLG extension on the file name. If you have previously run ChkDLG on this file and the output file still exists on the directory, you will be given the option of overwriting the output file or saving it under a new name. The default name for the output file is DLGFileName.CHK, and it will contain a listing of all the summary information produced during the current run of ChkDLG.

First, ChkDLG will read and display certain header information from the file; it will look something like the example on the following page. Often, only part of the information will be available in the file, and the rest will be left blank in ChkDLG's analysis.

This summary information will be followed by the prompt:

File contains N categories. Check categories? Y

Some examples of data categories in DLG files are types of hydrography (streams, canals, springs, lakes, wetlands), transportation systems (roads, railroads, transmission lines), boundaries, and topographic relief information. If you do not wish to see a summary of data records in the categories, answer N(o) and ChkDLG will finish by writing the header information to the output file and going to the 'More Utilities?' prompt. If you answer Y(es), the header information in

NATIONAL WETLANDS INVENTORY DATA

Summary of selected fields:

Mapname: BENNETTS PIER

Sectional locator: Not included. Source date: 1981.

Source scale is 1:24000. Projection is UTM. Units are meters.

Data structured in DLG level 3 topology.

Projection parameters are:

```
-7.500000000000000E+007 3.900000000000000E+007 0.000000000000000E+000
0.000000000000000E+000 0.000000000000000E+000 0.000000000000000E+000
0.000000000000000E+000 0.000000000000000E+000 0.000000000000000E+000
0.000000000000000E+000 0.000000000000000E+000 0.000000000000000E+000
0.000000000000000E+000 0.000000000000000E+000 0.000000000000000E+000
```

File coordinates represent projection.

Corner control points:

SW LAT/LON: 39.000000 -75.375000 maps to: 467527.21 4316635.48

NW LAT/LON: 39.125000 -75.375000 maps to: 467584.42 4330506.80

NE LAT/LON: 39.125000 -75.250000 maps to: 478389.63 4330469.61

SE LAT/LON: 39.000000 -75.250000 maps to: 478351.49 4316598.32

4 control points processed.

addition to the total number and highest value for node, area and line records in each category will be listed to the screen and the output file. For the WETLANDS category in the Bennetts Pier example, this would be:

Category WETLANDS has:

200 node records (highest value is 200).

121 area records (highest value is 121).

276 line records (highest value is 276).

Then you will be asked

***Do you want to compare major minor codes
to a Lookup Table containing MapID's (Y/N)? N***

If you have a Lookup Table relating major minor codes to attributes, answer Y and you will be prompted for the name of the Lookup Table file. (See the sections on "Lookup Table Format" and "DLG2QM" for a description of Lookup tables and their use.)

Next, the individual numbers for each element type (node, area, and line) will scroll across the screen as their records are processed. At the end of each element list, the total number of nodes, areas or lines, and the range of internal ID numbers for that element will be displayed. The

information displayed on the screen during processing of the area records for the WETLANDS data is shown below.

Processing area record . . .

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121									

Number of Areas scanned = 121

Area internal IDs range from 1 to 121

Finally, a summary of major minor codes by category and by record type will be given.

Category WETLANDS contains:

- 32 Major minor (Mm) codes,
- 32 of which will be built into
- 32 mapIDs composed of approximately
- 276 arcs and 4797 coordinates.

When summarized by record type:

- 0 of 200 nodes are linked to Mm codes.
- 121 of 121 areas have Mm codes linked to 275 lines.
- 3 of 276 lines have Mm codes.
- 0 of 276 lines are points (ie degenerate lines).
- 4797 coordinates in line records.

The next prompt will be

Do you want codes listed? N

If you answer Y(es), and did not previously specify a Lookup Table, all the Major minor codes found in the DLG file will be listed in Major minor order. If you answer Y(es) and have specified a Lookup Table, only Major minor codes found in the DLG file and in the Lookup Table are listed will be listed, together with the mapIDs associated with them in the Lookup Table. These lists

are sent to the screen and written to the output file. Answer N(o) only if you are not interested in Major minor codes.

Next, the program will announce

***Finished
More Utilities? Y***

Answering Y(es) will return you to the EXAMINE menu, and N(o) will exit QMUtil and return to the DOS prompt.

Checking QuickMAP Databases

QMUtil provides three utilities for checking the integrity of QuickMAP mapfiles: ChkArcs, ChkIDs, and ChkSets provide information focused on arcs, mapIDs, and sets, respectively. To run one of the checking utilities, first invoke QMUtil at the DOS prompt as described previously, and select the EXAMINE option from the Main Menu.

ChkArcs

To run ChkArcs select 'CHECK a Mapfile's Arc Index against its Arc Coordinate Records' from the EXAMINE menu.

CHECK a MOSS Export File and Summarize the Contents (CHKMOSS)
 CHECK a DLG-3 Optional File and Summarize the Contents (CHKDLG)
 ► CHECK a Mapfile's Arc Index against its Arc Coordinate Records (CHKARCS)
 CHECK a Mapfile's MapID Index against the MapID Table Records (CHKIDS)
 CHECK a Mapfile's Table Structure (CHKSETS)
 AUDIT a Mapfile's MapIDs and Arcs (AUDIT)
 DUMP a Mapfile's data structures (DUMPMAPF)

You will be asked to enter a mapfile name and the path to your

QMAP directory will be entered automatically as a default. Edit the default as needed to show a full path to the file. After indicating how many arcs are in the mapfile to be checked, the program will ask if you want the output sent to a printer, the computer screen, or a file. If the report is too long to fit on one screen, it may scroll past too fast to be read. For a permanent record, choose either 'printer' or 'file'. If you choose 'file', the program automatically assigns a name consisting of the mapfile name plus the extension '.CKA', but you may edit this name if desired. The report file is written to the directory containing the mapfile. ChkArcs checks all arc pointers in a mapfile and reports any invalid pointers. All arc names, the number of points in each arc, and unused arc

TestMap.CKA

Check Arcs Run on testmap

Checking 7 arcs . . .

Arc SWDITC 148 has	10 points	Arc SWPOND 166 has	43 points
Arc SWPONDH 1 has	16 points	Arc SWWELL 149 has	2 points
Arc SWWELL 151 has	2 points	Arc SWWELL 152 has	2 points
Arc SWWELL 153 has	2 points		
All indexed arc pointers are valid			
Checking unused arc space . . .			
There are no unused arc records.			

space are also reported. The output from running ChkArcs on the sample mapfile TESTMAP is shown above. The sample MOSS export file was first shown in this chapter in the section entitled "MOSS export format." It was imported into QuickMAP using MOSS2QM to produce the TESTMAP mapfile, and the arcs were assembled into mapIDs using the ASSEMBLY module.

You will also be asked if you wish to **Report each record?** If you answer **Y(es)**, the record number and location of each record having free blocks, and the number of free blocks, will be added to the report. If you answer **N(o)**, a summary statement will be included at the end of the report, giving the total number of unused arc records with the total number of blocks free.

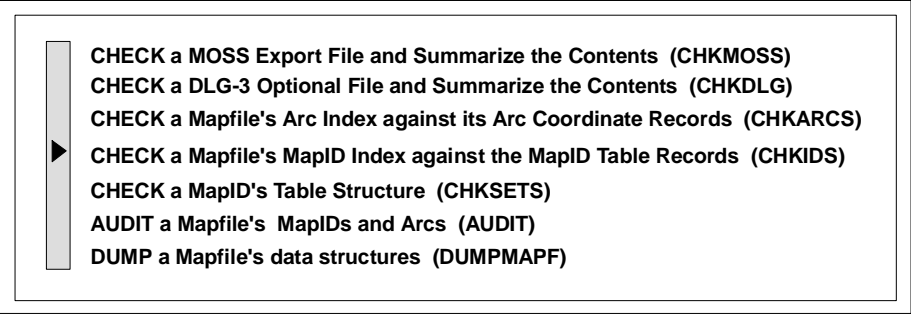
When ChkArcs is finished, you will be asked

More Utilities? Y

Accepting the "Y" default will return you to the QMUtil EXAMINE menu; "N" will terminate QMUtil and return you to the DOS prompt.

ChkIDs

To run ChkIDs, proceed as before but select 'CHECK a Mapfile's MapID Index against its MapID Table Records' from the EXAMINE menu.



- CHECK a MOSS Export File and Summarize the Contents (CHKMOSS)
- CHECK a DLG-3 Optional File and Summarize the Contents (CHKDLG)
- CHECK a Mapfile's Arc Index against its Arc Coordinate Records (CHKARCS)
- ▶ CHECK a Mapfile's MapID Index against the MapID Table Records (CHKIDS)
- CHECK a MapID's Table Structure (CHKSETS)
- AUDIT a Mapfile's MapIDs and Arcs (AUDIT)
- DUMP a Mapfile's data structures (DUMPMAPF)

You will again be asked for the name of a mapfile to be checked and where you want the output sent. If you select a 'file' for output, it will be given the name "mapfilename.CKI". You may edit this name if desired. The next question will be:

Do you want Table information included?

ChkIDs checks for and reports invalid ID pointers and unused ID space. If the optional 'Table information' is selected, ChkIDs first shows the mapfile header, which includes the date and with what version of QuickMAP the mapfile was created, a summary of information about the .QMA, .QMI, .QMV and .QMT files that comprise a QuickMAP mapfile, and a list of the coordinates that define the mapfile MBR (Minimum Bounding Rectangle). The table information itself includes all ID names with arc total, set total, and number of structures (arcs plus sets) for each ID, and a record for each set including set type, number of arcs in the set, arc names, and arc pointers. File TESTMAP.CKI, containing the output from running ChkIDs on the sample mapfile, is illustrated on the next page; the optional table information is included.

When 'ChkIDs' is finished, you will be asked if you want

More Utilities? Y

Answer yes (Y) to return to QMUtil's EXAMINE menu, or no (N) to return to DOS.

TestMap.CKI

TESTMAP map files created on 30-MAY-91 7:20 using version 1.2

File information	.QMA	.QMI	.QMV	.QMT
file size	2049	2049	1201	641
block size	2048	2048	40	128
first block	0	0		
last block	0	0		
head free block	-1	-1	7	-1
largest free record			1	0
total items	7	3		

Mapfile MBR 3085864.25 1225792.375 3088111.5 1227249.125

Checking 3 IDs . . .

DITCH

Arc total =1

Set total = 1

Number of structures = 2

Line 1 Arcs Narcs= 1

1 SWDITC 148 Arc Ptr= 1

POND

Arc total =2

Set total =2

Number of structures =4

Outline 1 Arcs Narcs= 1

1 SWPOND 166 Arc Ptr= 8

1 SWPONDH 1 Reverse Arc Ptr=18

WELLS

Arc total =4

Set total =4

Number of structures =8

Points 1 Arcs Narcs= 1

1 SWWELL 149 Arc Ptr= 22

Points 1 Arcs Narcs= 1

1 SWWELL 151 Arc Ptr= 24

Points 1 Arcs Narcs= 1

1 SWWELL Arc Ptr= 26

Points 1 Arcs Narcs= 1

1 SWWELL Arc Ptr= 28

Checking unused ID space . . .

There are no unused ID Tables.

ChkSets

Running ChkSets (the fifth choice on the EX-AMINE menu) is similar to running ChkIDs; you will be asked for a mapfile name, an output choice, and whether you want table information.

CHECK a MOSS Export File and Summarize the Contents (CHKMOSS)
 CHECK a DLG-3 Optional File and Summarize the Contents (CHKDLG)
 CHECK a Mapfile's Arc Index against its Arc Coordinate Records (CHKARCS)
 CHECK a Mapfile's MapID Index against the MapID Table Records (CHKIDS)
 ► CHECK a MapID's Table Structure (CHKSETS)
 AUDIT a Mapfile's MapIDs and Arcs (AUDIT)
 DUMP a Mapfile's data structures (DUMPMAPF)

ChkSets checks for and reports invalid pointers and unused space. If the optional Table information is requested, the mapfile header information described for ChkIDs is given plus the following: the ID name, number of sets, and number of arcs in each ID; set type, number of points,

TestMap.CKS

TESTMAP map files created on 30-MAY-91 7:20 using version 1.2

File information	.QMA	.QMI	.QMV	.QMT
file size	2049	2049	1201	641
block size	2048	2048	40	128
first block	0	0		
last block	0	0		
head free block	-1	-1	7	-1
largest free record			1	0
total items	7	3		
Mapfile MBR	3085864.25	1225792.375	3088111.5	1227249.125

Checking 3 IDs . . .

	Set type	Number arcs	Points in set	Number holes
DITCH	has 1 sets; 1 arcs			
	Line	1	10	
POND	has 2 sets; 2 arcs			
	Outline	1	43	
	Hole	1	16	1
WELLS	has 4 sets; 4 arcs			
	Points	1	2	
	Points	1	2	
	Points	1	2	
	Points	1	2	

Checking unused ID space . . .

There are no unused ID Tables.

arc names, and number of holes for each set. Running ChkSets on the sample mapfile and selecting the optional table information produces the output shown on the preceeding page.

When ChkSets is finished, you may choose to return to the QMUtil EXAMINE menu or to DOS.

AUDIT

Often it is helpful to have a listing of the arcs or mapIDs in a mapfile as a reference when assembling more IDs, composing displays, or otherwise manipulating the data. QuickMAP's

- CHECK a MOSS Export File and Summarize the Contents (CHKMOSS)
- CHECK a DLG-3 Optional File and Summarize the Contents (CHKDLG)
- CHECK a Mapfile's Arc Index against its Arc Coordinate Records (CHKARCS)
- CHECK a Mapfile's MapID Index against the MapID Table Records (CHKIDS)
- CHECK a MapID's Table Structure (CHKSETS)
- ▶ AUDIT a Mapfile's MapIDs and Arcs (AUDIT)
- DUMP a Mapfile's data structures (DUMPMAPF)

AUDIT utility sends a list of IDs and arcs in a selected mapfile to the screen, printer, or a text file.

To run AUDIT, begin by running QMUtil as described previously. Select the EXAMINE

option from the Main Menu. Next select the sixth option, 'AUDIT a Mapfile's MapIDs and Arcs' from the EXAMINE menu. The screen will be cleared and a message will be displayed:

***** **Utility to List IDs and Arcs** *****

Enter Mapfile:

The path will default to your QMAP directory. Edit the path if necessary, and enter the name of the mapfile for which a list is desired. Next, the following will be displayed:

Send output to (F)ile, (P)rinter, (S)creen? F

You may have the list sent to the computer screen by entering an S, to the printer by entering P or to a text file. The F that appears automatically indicates that File output is the default and may be selected simply by pressing < Enter>. Note that if you select screen output and the list is lengthy, it may scroll across the screen too rapidly to be read. If you select P, be sure that your printer is connected to the computer and ready to print. If you select File output, another message will be displayed:

Send output to file: filename.aud

The output filename will default to the mapfile name previously provided (including path) plus the extension .AUD. You may accept this default by pressing < Enter> or you may change it using QuickMAP's editing keys.

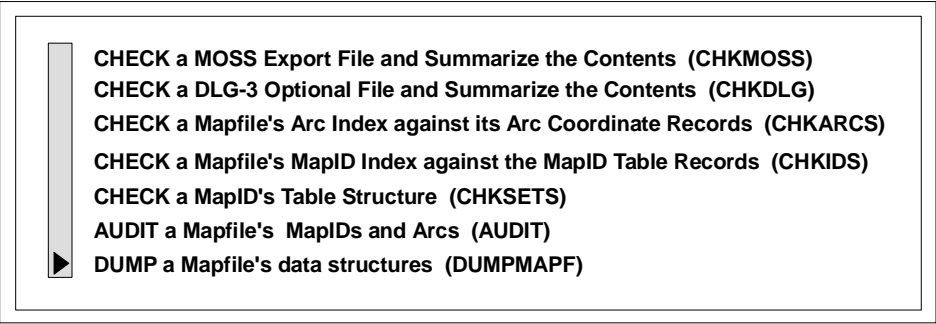
The program will work briefly, sending the list to screen, printer or file. The list will state the total number of IDs and the name of the mapfile, followed by an alphabetical listing of all ID names and then the total number of arcs with a list of all individual arc names. Next, you will be asked:

More Utilities? Answer "Y" to return to the QMUtil EXAMINE menu or "N" to exit QMUtil and return to DOS.

DumpMapf

QMUtil's DumpMapf utility provides a detailed examination of the arc and ID structure in a QuickMAP mapfile. This information is not otherwise available because the files comprising a QuickMAP mapfile are written in a form not easily interpreted by the layman. MBR (Minimum Bounding Rectangle), storage size and composition of individual arcs, sets and mapIDs may be examined. This type of information may be especially helpful in the event a mapfile somehow becomes corrupted.

To run DumpMapf, select the EXAMINE option from the QMUtil Main Menu. Then select option seven, 'DUMP a Mapfile's data structures (DUMPMAPF)' from the EXAMINE menu.

A screenshot of a menu box with a vertical scrollbar on the left. The menu contains seven options, each in all caps. The last option, 'DUMP a Mapfile's data structures (DUMPMAPF)', is highlighted with a black arrow pointing to it from the left.

CHECK a MOSS Export File and Summarize the Contents (CHKMOSS)
CHECK a DLG-3 Optional File and Summarize the Contents (CHKDLG)
CHECK a Mapfile's Arc Index against its Arc Coordinate Records (CHKARCS)
CHECK a Mapfile's MapID Index against the MapID Table Records (CHKIDS)
CHECK a MapID's Table Structure (CHKSETS)
AUDIT a Mapfile's MapIDs and Arcs (AUDIT)
DUMP a Mapfile's data structures (DUMPMAPF)

The screen will be cleared and the following prompt will appear:

Enter map's file name:

The QMAP drive and directory will automatically be entered as a default. Edit the path as necessary and enter the name of a QuickMAP mapfile to be examined. When the name of a valid mapfile is entered, the prompt will be

Send output to file(F), screen(S), or printer(P) ? F

Depending on how much information will be dumped, it may scroll across the screen too fast to read. Send the output to the printer or a file if you wish to keep a permanent record. If you choose the default, F for file, the next prompt will appear:

Send output to file MAPFILENAME.DMP

where MAPFILENAME will be the drive, directory and QuickMAP mapfile name being examined. The .DMP extension is automatically provided. You may accept this default or edit it as desired.

Finally, the following will be offered:

Choices of structures to dump are:

- 1) Arc index***
- 2) ID index***
- 3) Specific Arc record (from index)***
- 4) Specific ID record (from index)***
- 5) Exit***

?

Whichever option is chosen will produce a summary of the mapfile structure including date the mapfile was created, mapfile MBR, sizes of the four files (.QMA, .QMI, .QMV, and .QMT) comprising the database, and information about the "blocks" of data in these files. (Space is allocated for data in blocks, block size varying in the different file types: 2048 bytes in the .QMA and .QMI files, 40 bytes in the .QMV, and 128 in the .QMT.)

If '1) Arc index' is chosen, the total number of arcs in the mapfile, the number of blocks allocated for these arcs, and the first, last and first free block are given. This information is followed by a listing of all individual arcs in each block. Each arc name is followed by an index value, which is the pointer used to locate information about the arc and may be used with choice 3 to examine an individual arc more closely.

Choosing '2) ID index' gives the total number of IDs in the mapfile and the number of blocks used for their storage, the first, last and first free block, and a listing of all the IDs in each block. Each ID name is followed by an index, or pointer value used to locate information about the ID. This index value may be used with option 4 to more closely examine a specific mapID.

If '3) Specific Arc record (from index)' is chosen, the prompt is:

Enter arc record number from index

Enter the index, or pointer value listed by option number 1 for the particular arc you wish to examine. This will produce a summary of information about that arc including the number of blocks allocated for the arc, the number of coordinates the arc contains, and the number of mapIDs to which the arc belongs. This is followed by a listing of the individual coordinate values comprising the arc and the names of the IDs containing the arc.

Choice '4) Specific ID record (from index)' produces the prompt:

Enter ID record number from index

Enter the index value listed by option 2 for the particular mapID you wish to examine. The following information about that ID will be provided: the number of blocks allocated to the ID,

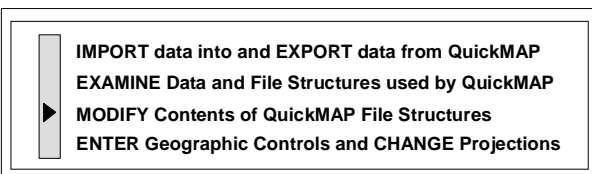
the number of sets in the ID, and the ID's MBR. Each set in the mapID will then be listed separately with the set type (points, lines, outline or hole), set MBR, and individual arcs comprising the set. Pointers, or index values for the arcs in each set also will be given.

When the listing (to file, printer or screen) has been completed for the option selected, the choice menu is again displayed. You may choose to dump another structure for the same mapfile, or select '5) Exit'. The latter choice will display the **'More Utilities?'** prompt. A Y(es) answer will return you to the QMUtil EXAMINE menu; N(o) will quit QMUtil and return to the DOS prompt.

Modifying Contents of QuickMAP File Structures

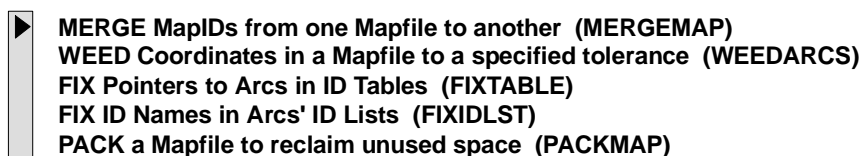
Merging Mapfiles and IDs

MergeMap is a utility that combines the IDs and arcs of two QuickMAP mapfiles. A new mapfile containing IDs selected by the user is created, so the source and target mapfiles are not modified in the process. For MERGEMAP to work, the mapfiles should be in the same projection.



To begin, run QMUtil from the DOS prompt. Select the MODIFY option from the Main Menu.

Then select the first option, 'MERGE MapIDs from one Mapfile to another' from the MODIFY menu. The first prompt will be:



Enter the Source mapfile you wish to merge From:

A default drive and directory will be provided. Edit as necessary, and type in the name of a QuickMAP mapfile that you wish data to be taken from. When the source mapfile has been located, a prompt for the target mapfile will be displayed.

Enter the Target mapfile you wish to merge To:

Again, edit as necessary to provide a path and target mapfile name. When the combined mapfile is created, all information originally in the target mapfile will be included. But only information specified by the user will be added from the source mapfile.

After the target mapfile has been located, the following will be displayed:

File containing merge transactions is: TRANSAXN.MRG

This file will contain a summary of the merge procedure. You may edit the path and filename is desired. Next,

Merge Options

- 1. Entire mapfile - All IDs and All arcs***
- 2. Selected IDs and their associated arcs***

Please enter the Number of the option desired: 1

Selecting option 1 will cause all arcs and any existing IDs in the source mapfile to be merged into the target mapfile. If no IDs exist in the Source, you will be informed of this but all of the arcs still will be merged.

If you select option 2, the following will be displayed:

Enter Selected ID names from a File (F) or Keyboard (K)?

Select K and you will be prompted to

Enter the next ID or press < Enter> to end

You may then type the name of an ID you want merged from the source to the target mapfile. You will continue to be prompted to enter additional ID names until you complete the process by pressing only the <Enter> key.

Select F and you will be prompted to

***Enter the name of the file containing ID names to Merge:
Enter the directory where it can be found:***

You may enter the name of a file you have created listing the names of all the IDs you want merged from the source mapfile. This should be an ASCII text file with the MapID names one per line. The input file may contain only as many ID names as there are in the source mapfile. The final line of the file should contain the single word "end" (upper or lower case, without the quotes). Mergemap will read the ID names and list them on the screen as they are processed.

Whether you selected the 'Entire mapfile' or 'Selected IDs' option from the 'Merge Options' menu, the following message will be displayed next:

Processing Arcs . . .

If duplicate arc names are encountered in the source and target mapfiles during processing, you will be prompted to enter a new family name for one of the arcs to avoid over-writing any data. If duplicate ID names are found, the prompt will be:

Choices for resolving ID name conflicts are:

***Merge IDs (M)
rePlace ID in target (P)
or reName ID (N)***

Enter M, P, or N for [ID name with conflict]

If you select M, an ID will be created, consisting of all the arcs and sets originally contained in the source and target IDs having the same name. The original (duplicate) ID name will be retained.

Selecting P will cause the target ID to be eliminated and replaced by the source ID having the same name. If you select N, you will be prompted to enter a new name for the source ID, and then both IDs will be retained in the merged mapfile.

MergeMap also writes a file that summarizes the processing, indicating the resolution of any name conflicts. This file, called TRANSAXN.MRG, is written on the directory where the target mapfile is located. It is over-written each time MergeMap is run, so if you wish to save the information, copy it to a file with another name before running MergeMap again.

When the merge process is complete, you will be given two more options. You may provide a new name for the merged mapfile, thus preserving both the source and target mapfiles in their original state. Or the target mapfile may be over-written with the new merged results. When the work has been saved, the prompt will be

More Utilities?

Answering Y(es) will return you to the QMUtil MODIFY menu; N(o) will exit QMUtil and return to DOS.

Weeding Arcs

WeedArcs is a QuickMAP utility that will remove some of the points from the arcs in a QuickMAP mapfile, thus reducing the overall size and complexity of the mapfile. Sometimes this is necessary when a mapfile is too large and complex to import into certain word processing or graphics packages, or for some functions to be carried out by QuickMAP's DISPLAY module. The user selects a "threshold" for weeding that determines what percentage of points will be removed.

To run QMUtil's WEEDARCS, begin by running QMUtil as described previously. Select the MODIFY option on the Main Menu.

Then select the second option, 'WEED Coordinates in a Mapfile to a specified tolerance', from the MODIFY menu. The screen will be cleared and the following will be displayed:

MERGE MapIDs from one Mapfile to another (**MERGEMAP**)

WEED Coordinates in a Mapfile to a specified tolerance (**WEEDARCS**)

FIX Pointers to Arcs in ID Tables (**FIXTABLE**)

FIX ID Names in Arcs' ID Lists (**FIXIDLST**)

PACK a Mapfile to reclaim unused space (**PACKMAP**)

```

*****      WEEDARCS - Utility to reduce the      *****
*****      number of coordinates in a mapfile      *****

```

Enter name of mapfile to be weeded:

Enter the name of a QuickMAP mapfile. If it is not located on the QMAP directory (the default), include the full path to the mapfile. When the mapfile has been located, you will be asked to

***Enter a new mapfile name to save results in, or
<CR> to preview weeding results:***

The path and filename previously entered for mapfile to be weeded will be entered automatically as a default. Edit the entry to give the name of a QuickMAP mapfile if you wish the results of the weeding process to be saved. WeedArcs will not overwrite a previously existing mapfile, so be sure to give a combination of path and mapfile name that does not already exist. Or, if you wish to have the results of the weeding process only reported to the screen, press < Enter>. Weeding a mapfile is a "trial and error" type of process, so simply viewing the projected results will give you an idea of how much data will be eliminated with a specific threshold value before actually creating a new mapfile.

If a mapfile name was entered, it will be created and the name of a file containing a summary of the weeding process will be listed. The summary file will be named MAPFILENAME.QMW. Next, two choices will be offered.

Do you want to use:

- 1. Area rule based on three consecutive points, or**
- 2. Distance rule based on distance from trend line.**

? 1

After you have selected number 1 or 2, the following question will be displayed:

What area (or distance) threshold will be used for weeding?

For either the area or distance method, the units of measurement applied should be the same as the coordinate units in effect for the mapfile being weeded. If you are in doubt, the coordinate units can be checked by opening the mapfile in the QuickMAP GALLERY and then examining 'Mapfile Info' in the 'Information' menu.

The "area rule" and "distance rule" represent two different methods that can be used in combination with a "threshold" value to control the weeding process. The threshold you select will determine what percentage of the data points will be eliminated from the mapfile. To decide what threshold you wish to try, you should have some concept of the minimum resolution necessary for your particular use of the mapfile to be weeded.

For the area method, consecutive points in an arc are connected to form triangular areas that are compared to the threshold value. A triangle with an area less than the area threshold value is "smoothed out" by eliminating the center point. As an example, if you enter an area threshold of 500, the WeedArcs program would eliminate any data points that define areas smaller than 500 square meters. Picture a rectangle on the ground with an area of 500 square meters. Giving WeedArcs an area threshold of 500 would limit the resulting map resolution to objects or areas that are at least as big as that rectangle.

With the distance method, the threshold value defines the amount of separation between points that produces a detectable change of direction in a line or curve. The distance threshold can be thought of as being roughly equivalent to map resolution. As an example, the USGS considers national map accuracy to be within .02 inches on a map. At a scale of 1:24000, this translates to a resolution of 40 feet or 12.2 meters. The distance threshold for data at this scale would be 6.1 meters (half of 12.2, since the deviation away from a line or curve can be measured in either direction). For data at a 1:100,000 scale, the threshold would be 25.4 meters.

As mentioned previously, weeding arcs is a trial and error process. It is often difficult to predict which weeding method and what threshold value will produce the best results (ie., eliminate the most points while preserving enough resolution to look good). In general, the area method preserves corners better than the distance method. The area method might therefore be used if corners are to be used as registration (or control) points. The area method can also be used with a threshold of zero to eliminate points along straight lines. The distance method preserves tight curves better, but may overly flatten shallow curves. It could be used to advantage with highly convoluted polygon data. With some practice, you will be able to choose a weeding method and

threshold value that will produce an acceptable compromise between useable mapfile size and desired resolution. After you have selected a weeding method and entered a threshold value, the display will show

Processing Arc ...

and the name of each arc in the mapfile will be listed on the screen as its coordinate points are checked for weeding. When all of the arcs have been processed, a summary of the results will be displayed as the total number of points (in all arcs) before weeding, the total number of points after weeding, and the average percentage of points weeded. Also, the total number of arcs processed and the time elapsed is reported. Then:

Do you want to see results for each arc ([Y]/N ? Y

If you answer "Y", a table will be displayed showing the name of each arc in the mapfile, the number of points the arc contained before and after weeding, and the percentage of points removed from the arc by the weeding process. If the table takes more than one screen to display, the program will stop at the end of each screen of information and prompt for permission to continue. A reminder will be issued that a copy of the table is in the file mapfilename.QMW, where "mapfilename" is the name you gave for a mapfile to store the weeded arcs. Finally, you will be asked

More Utilities?


Entering Y will return you to the QMUtil MODIFY menu. Entering N will terminate QMUtil and return you to DOS.

Fix ID List and FixTable

The QuickMAP utilities FixTable and FixIDLst may be used to correct some specific types of damage to mapfiles. You may use the utilities for routine mapfile maintenance, but most commonly they will be used when you know of a mapfile problem.

For example, sometime you may get the error message 'Invalid pointer or arc record' while using ASSEMBLY or DISPLAY. For QuickMAP to run properly, precise records must be kept of all the arcs in a mapfile and of their associations into mapIDs. This information must be quickly and accurately updated whenever a mapfile is modified. QuickMAP keeps the information in tables and uses "Pointers" to point from the information to the arc it describes. Occasionally a pointer becomes misdirected and can no longer be used to locate the proper arc. This is when you may get the 'Invalid pointer or arc record' message. If this happens, exit QuickMAP and graphics mode by following the instructions in the appendix "Error Handling and Reporting". Then try using FixTable to repair the bad mapfile.

Begin by running QmUtil from the DOS prompt. Select the MODIFY option from the Main Menu. Then select option 3, 'FIX Pointers to Arcs in ID Tables (FIXTABLE)',



MERGE MapIDs from one Mapfile to another (MERGEMAP)
WEED Coordinates in a Mapfile to a specified tolerance (WEEDARCS)
FIX Pointers to Arcs in ID Tables (FIXTABLE)
FIX ID Names in Arcs' ID Lists (FIXIDLST)
PACK a Mapfile to reclaim unused space (PACKMAP)

from the MODIFY menu. The screen will be cleared and the following will be displayed:

******* Utility to Fix Pointers to Arcs in ID Tables *******

Which mapfile would you like to fix?

with the QMAP directory entered as a default. Edit the path if necessary and enter the name of the damaged mapfile. The next prompt will be:

Send output to file (F), screen (S), or printer (P)? F

If (F) is chosen, the location of an output file, MapFileName.CKT, will be displayed.

FIXTABLE first will read the mapfile's Arc Index File and make a list of all the arcs and their pointers. Next it reads the mapfile's ID Table one ID at a time and checks the pointer from the ID Table to each arc. If the ID Table pointer is different from the Index File pointer for a particular arc, the Index pointer is copied to the ID Table to resolve the conflict. This allows QuickMAP to accurately locate the arc and its associated information. A list of arcs for which the pointers have been fixed will be displayed and, when the process is complete, the prompt will be

More Utilities?

Enter Y to return to the QMUtil MODIFY menu or N to exit QMUtil and return to DOS.

When arcs are associated into mapIDs, this information is stored in an ID Table and in the arcs' ID Lists. An ID Table contains, among other things, pointers to all the arcs in each ID. Each arc, in turn, has an ID List that lists all the IDs with which that arc is associated. Infrequently, a mapfile may be damaged in such a way that an arc's association with a certain ID is recorded in the ID Table, but the information is not contained in the arc's ID List. This will cause problems when that ID is used in DISPLAY or ASSEMBLY. FixIDLst is designed to correct such a problem.

Begin as before and select MODIFY from the QMUtil Main menu. Then select 'FIX ID Names in Arcs' ID Lists (FIXIDLST)' from the MODIFY menu and the following will be displayed.

******* Utility to Fix Arcs' ID Lists *******

Which mapfile would you like to fix?

Edit the default to give the name of the damaged mapfile, changing the path if needed. Then you will be prompted to choose

Send output to file (F), screen (S), or printer (P)?

If you choose file (F), the location of the output file, MapFileName.CKV, will be displayed.

FIXIDLST will read the arc record for each ID in the ID Table and compare that to the information in the arcs' ID Lists. Any IDs not included in an arc's ID List that should be there will be added. Each such addition will be indicated by a message on the computer screen naming the ID and the arc involved. When all the necessary corrections have been made, the prompt will be


More Utilities?

Enter Y to return to the QMUtil MODIFY menu or N to return to DOS.

PackMap

As discussed in part 2 of this manual ('Data Structures Used by QuickMAP'), a QuickMAP mapfile consists of four separate files, each with a very precise organization. As a mapfile is used and edited, arcs and IDs may be rearranged and eliminated. The overall organization of the mapfile will be maintained, but gaps in the data structure may be created where selected data has been deleted or moved. An indication of the amount of unused free space in a mapfile may be obtained by running the mapfile checking utilities, ChkArcs, ChkIDs and ChkSets, described earlier in this chapter. Eventually, it may become desirable to reduce the disk space required to store a mapfile by "packing" it to eliminate unused space. QMUtil's Pack-Map utility may be used to accomplish this.

To begin, start QMUtil from the DOS prompt and select the MODIFY option from the Main Menu. Then select the fifth option, 'PACK a Mapfile to reclaim unused space' from the MODIFY menu. The screen will be cleared and the following will be displayed:



MERGE MapIDs from one Mapfile to another (MERGEMAP)
WEED Coordinates in a Mapfile to a specified tolerance (WEEDARCS)
FIX Pointers to Arcs in ID Tables (FIXTABLE)
FIX ID Names in Arcs' ID Lists (FIXIDLST)
PACK a Mapfile to reclaim unused space (PACKMAP)

*******Utility for reclaiming unused space in mapfiles*******

Enter the name of the mapfile you want packed:

The QMAP drive and directory will be entered as a default. Edit the path as necessary and enter the name of a mapfile to be packed.

Several messages will be written to the screen to indicate the progress of the packing process.

Adding pointers to arcs

Adding pointers to IDs

Packing arcs

Packing IDs

The process is concluded with the ***More Utilities?*** prompt. Y(es) returns you to the MODIFY menu, and N(o) terminates QMUtil and returns to the DOS prompt.

Basically, PACKMAP transfers all the arcs and IDs to intermediate files, reorganizes the pointer structure for locating them, and then writes everything back to the original mapfile. When opened in QuickMAP, the mapfile will have all the same information as before packing; nothing but empty space is removed! The amount of space reduction depends on how much unused space existed before packing. Since this is a non-destructive procedure, you may re-pack a QuickMAP mapfile as often as you wish.

Establishing Geographic References

Control Points

The QuickMAP CtrlPts utility converts coordinates in a DD,MM,SS.SS (degrees, minutes, seconds) format to a DD.DD (decimal degrees) format and writes them to a MOSS export file. It may be used to prepare geographic control points for import into a QuickMAP mapfile, which may then be used for map and tablet registrations. CTRLPTS does not read files; the coordinates to be converted must be entered at the keyboard.

Begin by running QMUtil from the DOS prompt. Select the ENTER/CHANGE option from the Main Menu.

IMPORT data into and EXPORT data from QuickMAP
EXAMINE Data and File Structures used by QuickMAP
MODIFY Contents of QuickMAP File Structures
ENTER Geographic Controls and CHANGE Projections

CREATE a MOSS Export File with Geographic Control Points (CTRLPTS)
CREATE a MOSS Export File with Latitude/Longitude Graticule (LLGRID)
CHANGE Projection of a QuickMAP Mapfile (PROJECT)
CHANGE a MOSS Export File's Projection (PROJECT)
CHANGE a coordinate value to another projection (PROJECT)

Then select the first option, 'CREATE a MOSS Export File with Geographic Control Points', from the ENTER/CHANGE menu. The following messages will be displayed.

CTRLPTS Utility to enter and convert latitude and longitudes in degrees, minutes, seconds to decimal degrees

Enter values in degrees, minutes, and decimal seconds (ie DD,MM,SS.S). Seconds, or Minutes and Seconds, may be omitted if their values are zero. Remember that longitude values are assumed to be in the Western Hemisphere so DON'T enter them with negative values!

Use the Page Up key to recall previously entered value for editing, or Enter BACK (or b) to correct previously entered values.

After all values are entered, press <Enter> on the next line to save them in a MOSS export file.

Point 1 Longitude?

Now you will be prompted for the longitude and latitude values that define geographic coordinates. You may continue to enter as many points as you wish. The process may be completed by pressing only <Enter> at a 'Longitude' prompt.

If you make a mistake while entering values, you may use the editing keys to correct errors as follows. Consider each point value or coordinate pair (a Longitude plus a Latitude) to be a "paragraph". To back up to the preceeding paragraph, type "back" or "b" and press <Enter>. Each individual Longitude or Latitude value may be considered to be a "line", and the part of a value between commas a "word". For example, for a Longitude value of "80,30,00", the whole value would be a "line" and the "words" would be "80", "30", and "00".

The **line** editing keys include: < End>, F3, Ctrl-G, or < Page Up> / < Page Down> , each of which advances the cursor to the end of the current line and fills in a default value. The default is selected from values previously entered at the keyboard during the current editing session and saved in a buffer. For the < End>, F3, Ctrl-G and < Page Up> keys, the default will be the most recently entered or "newest" word in the buffer. For < Page Down>, it will be the "oldest" word. The CTRLPTS buffer can save up to 64 words before it starts overwriting values at the beginning. Other line editing keys are: < Home>, which moves the cursor to the beginning of the current line; and Ctrl-End or Ctrl-N, which deletes all characters from the current cursor position to the end of the line.

The **word** editing keys include: Ctrl-R, F8, Ctrl-Q, or Ctrl-E to advance the cursor forward to the beginning of the next word in the current line; Ctrl-Left (arrow), F7, or Ctrl-W to back up to the beginning of the previous word in the current line; and F6 or Ctrl-V to delete all characters up to the first character of the next word.

Editing keys for single characters or digits include: Right (arrow), F1, or Ctrl-A, each of which advances the cursor one character to the right in the current word; Left (arrow) or Ctrl-L to back up one character within the current word; Backspace or Ctrl-H, which deletes the character to the left of the cursor and shifts the rest of the characters in the line over to fill the gap; and Delete or Ctrl-Z to delete the character at the cursor position and shift the rest of the characters in the line to fill the gap.

As an example, assume you entered the values shown below in response to the program prompts.

Point 1 Longitude? 80,30 Latitude? 27,15

While the cursor is still positioned after the "15", you notice that the Latitude value entered is incorrect. It should be "27,45,15". To move backward one "word" to the beginning of "15", you could press F7. Then type a "45" and a comma. These will be inserted in front of the "15". Press < Enter> to complete the paragraph. This would result in

Point 1 Longitude 80,30 Latitude? 27,45,15
Point 2 Longitude?

Now you discover you have made another mistake defining the first point. Enter **BACK** and you will be returned to the beginning of the first "paragraph":

Point 1 Longitude?

Press F3 to advance the cursor to the end of the current line, and it will also fill in (from the buffer) the previously entered line to give

Point 1 Longitude? 80,30

with the cursor resting at the end of the word "30". From there you may add additional characters onto the end of the line. Alternatively, when presented with the empty line

Point 1 Longitude?

you could have simply entered an entirely new longitude without using F3 to fill in the previously entered digits. You may continue to enter Longitude and Latitude values and move backward and forward through them to edit for as long as necessary.

When you have indicated that you are finished, by pressing <Enter> at the ***Longitude?*** prompt without entering a longitude value, the program will announce the total number of coordinates entered and will prompt:

***Enter file name to save as decimal degrees
in a MOSS export format***

Edit the default path as desired and type in the name of a file in which to save the coordinates. A file in MOSS export format will be created and the coordinate values written to it. When the program is finished writing the coordinates to the screen or a file, it will ask


More Utilities?

Enter Y to return to the QMUtil ENTER/CHANGE menu or N to terminate QMUtil and return to DOS

Latitude Longitude Grid

Another QuickMAP utility that may be used to establish geographic controls is LLGrid. Like CTRLPTS, LLGRID requires that you enter coordinates at the keyboard, but the values must be entered in decimal degrees format. The program then creates a Latitude/Longitude graticule based on the values entered and writes the information to a file in MOSS export format. This file may then be used to project the grid data to a known geographic system, and to import the graticule into a QuickMAP mapfile. Such a grid might be used, for example, to establish a reference to the 7.5' quadrangles covering the extents of a particular mapfile.

Begin by running QMUtil from the DOS prompt. Select the ENTER/CHANGE option from the Main Menu. Then select the second option, 'CREATE a MOSS Exort File with Latitude/Longitude Graticule' from the ENTER/CHANGE menu. The screen will be cleared and the following displayed:



- CREATE a MOSS Export File with Geographic Control Points (CTRLPTS)
- CREATE a MOSS Export File with Latitude/Longitude Graticule (LLGRID)
- CHANGE Projection of a QuickMAP Mapfile (PROJECT)
- CHANGE a MOSS Export File's Projection (PROJECT)
- CHANGE a coordinate value to another projection (PROJECT)

```
***** LLGRID - Utility to create MOSS Export file *****  
***** with Latitude/Longitude Graticule *****
```

Enter MOSS Export file name for output:

Edit the default path if needed and enter a suitable descriptive name that meets DOS standards. If the filename you enter already exists, you will be given the option of overwriting it or entering a new name. The next series of prompts will be:

Enter all values in decimal degrees where W and S hemispheres are negative
Enter lower and upper bound for latitude:
Enter lower and upper bound for longitude:
Enter grid spacing and coordinate increment:

When entering these values, you may use the editing keys described in the previous section on CTRLPTS. Separate the individual values with commas or spaces. The upper and lower bounds for latitude and longitude should define a box surrounding the area you wish the grid to cover. For example, latitude values of 24 and 31 and longitude values of -80 and -88 (negative in western hemisphere) would specify a graticule covering the state of Florida. The 'grid spacing' value specifies how many decimal degrees you want between ticks on the graticule, and the 'coordinate increment' places the latitude and longitude lines on the grid. For the example of a Florida graticule, specifying 0.5 for grid spacing and 1 for coordinate increment would result in 1 grid line for each degree latitude and longitude covered by the entire graticule, with a 0.5 degree grid

spacing. If imported into a mapfile, the graticule would have a total of 17 grid lines (8 latitude and 9 longitude lines) and tick marks 0.5 degrees apart.

The program works briefly and announces when it is

Finished.

Then

More Utilities?

Answering Y will return you to the ENTER/CHANGE menu, and N will exit QMUtil and return to DOS.

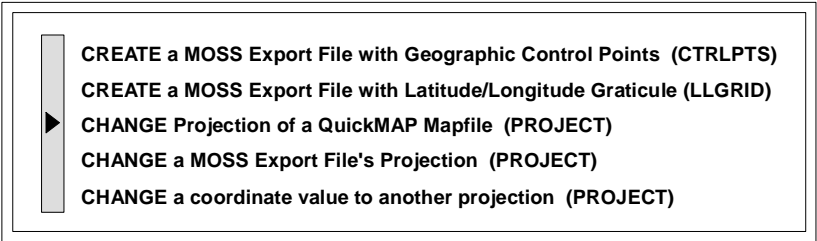
Changing Data Projection Systems

The PROJECT utility reprojects coordinate data from one projection to another. This utility currently supports seven of the most common projections, including Geographic, Universal Transverse Mercator, State Plane, Albers Conical Equal Area, Lambert Conformal Conic, Mercator, and Polyconic. For more information on map projections see:

Lee, J.E., and J.M. Walsh. 1984. Map projections for use with the geographic information system. U.S. Fish Wildl. Serv. FWS/OBS-84/17. 60 pp.

To start, enter QMUtil at the DOS system prompt and select the ENTER/CHANGE option from the Main Menu.

There are three selections on the ENTER/CHANGE menu that use the PROJECT utility in different modes. The third option on the menu, 'CHANGE a Mapfile's Projection', reprojects an entire QuickMAP mapfile. The fourth option, 'CHANGE a MOSS Export File's Projection', reprojects all the coordinates from a file in MOSS Export format. The fifth option in the ENTER/CHANGE menu, 'CHANGE a coordinate value to another projection', reprojects single coordinate values entered at the keyboard.



CREATE a MOSS Export File with Geographic Control Points (CTRLPTS)
CREATE a MOSS Export File with Latitude/Longitude Graticule (LLGRID)
▶ CHANGE Projection of a QuickMAP Mapfile (PROJECT)
CHANGE a MOSS Export File's Projection (PROJECT)
CHANGE a coordinate value to another projection (PROJECT)

Reprojecting a QuickMAP Mapfile

To change the projection of an entire QuickMAP mapfile, select the third option from the ENTER/CHANGE menu. The screen will be cleared and the following will be displayed.

***** *Welcome to the Projection Utility* *****

Enter input QuickMAP mapfile :

The path to your QMAP directory will be automatically entered as a default. Edit this as necessary to include the path and mapfile name you wish to reproject. Then you will be asked to

Enter output QuickMAP mapfile:

The path specified for the input mapfile will be entered as a default. Again, edit as necessary to provide a valid mapfile name to receive the reprojected data. Next, a menu of choices will be displayed.

Select Destination projection:**0) Geographic Latitude and Longitude****1) Universal Transverse Mercator****2) State Plane Coordinates****3) Albers Conical Equal Area****4) Lambert Conformal Conic****5) Mercator****6) Polyconic****99) Exit**

?

The projection of the input mapfile will not be included in the list. Enter the number corresponding to the projection of your destination mapfile. You will next be asked to enter a series of parameters that will vary depending on the projection specified. The geographic reference of latitude/longitude is not normally considered a projection and requires no parameters. However, longitudes in the western hemisphere must be entered as negative degrees.

UTM zones and projections are specified by a latitude and longitude within that zone or by zone number. State Plane zones and projections are specified by the USGS code number. The table below summarizes the parameters that must be provided for the Albers, Lambert, Mercator, and Polyconic projections. Units for State Plane may be specified in either feet or meters. Units for all other projections are in meters.

		Projections			
Projection Parameters		Albers	Lambert	Mercator	Polyconic
1st Standard Parallel		X	X		
2nd Standard Parallel		X	X		
Longitude of Central Meridian		X	X	X	X
Latitude of Origin of Projection		X	X	X	X
False Easting	X	X	X	X	
False Northing	X	X	X	X	

When all parameters for the destination projection have been entered, a summary of your selections similar to the following will be displayed.

******* Projection Parameters Selected *******

Source Projection: this is read from your source mapfile by Project

Projection parameters provided by Project

Destination Projection: projection you specified

Units provided by Project

[Other parameters] parameters you specified

This will be followed by a menu:

Choose an option:

- 1) Project [input filename]**
- 2) Redefine projection parameters**
- 3) Exit**

? 1

Choose option 1 (the default) to proceed with the reprojection. Selecting option 2 will return you to the point where you began specifying the target projection. This option may be used if you made a mistake and wish to start over. Option 3 will return you to the QMUtil ENTER/CHANGE menu.

If you choose option 1, the new destination mapfile will contain the reprojected data, including topographic structure (mapIDs) from the source mapfile. When the process is complete, the

More Utilities? Y

prompt will appear. Entering Y will return you to the ENTER/CHANGE menu in QMUtil; entering N will exit QMUtil and return you to the DOS prompt.

Reprojecting a MOSS Export File

From the QMUtil ENTER/CHANGE menu, select option 4. This option will read a file in MOSS export format that you specify and store the reprojected information in a new file you specify. The screen will be cleared and the following will be displayed.



CHANGE a MOSS Export File's Projection (PROJECT)

*** * * * Welcome to the Projection Utility * * * ***

Enter input MOSS export file:

You should enter the name of the MOSS export file containing the data to be reprojected. The default path to your QMAP directory will be provided and you may edit it as necessary. Next, you will be asked to

Enter output MOSS export file:

Enter a file name of your choice, which may include a path. It is recommended that you use a name that will remind you of the file contents and the projection the data is in. For example, you might use ".UTM" or ".LAM" as the file extension if the data is in the Universal Transverse Mercator or LAMbert projections, respectively. If the file you name already exists, you will be prompted to choose between overwriting it or entering another name. Next, you will be asked to

Select Source projection:

- 0) Geographic Latitude and Longitude**
- 1) Universal Transverse Mercator**
- 2) State Plane Coordinates**
- 3) Albers Conical Equal Area**
- 4) Lambert Conformal Conic**
- 5) Mercator**
- 6) Polyconic**
- 99) Exit**

?

Enter the number corresponding to the projection of the MOSS Export file you are reprojecting. As described in the previous section, you will be prompted for projection parameters that will vary depending on which projection you specify. Then you will be asked to

Select Destination projection:

- 0) Geographic Latitude and Longitude**
- 1) Universal Transverse Mercator**
- 2) State Plane Coordinates**
- 3) Albers Conical Equal Area**
- 4) Lambert Conformal Conic**
- 5) Mercator**
- 6) Polyconic**
- 99) Exit**
- ?**

Next you must provide projection parameters that will vary depending on the destination projection selected. When this is complete, a summary of your selections (like that described for 'Reprojecting a QuickMAP Mapfile') will be displayed. This will be followed by another set of options.

Choose an option:

- 1) Project [input filename]**
- 2) Redefine projection parameters**
- 3) Exit**
- ? 1**

Choose option 1 (the default) to proceed with the reprojection. Selecting option 2 will return you to the point where you began specifying source and target projections. This option may be used if you made a mistake and wish to start over. Option 3 will return you to the QMUtil ENTER/CHANGE menu.

If you select option 1, results will be computed in the destination projection and written to the specified file in the proper MOSS export format. These data may then be imported into a QuickMAP mapfile. When the reprojection is complete, the name of an output file (POutput.QMZ) summarizing the process will be displayed. This file is over-written each time Project is run, so be sure to save it under another name if you wish to keep a permanent record. Finally, you will be asked

More Utilities? Y

Answering Y(es) will return you to the QMUtil ENTER/CHANGE menu, and N(o) will exit QMUtil and return to DOS.

Reprojecting Single Coordinate Values

To change the projection of single coordinates, choose option 5 from the QMUtil ENTER/CHANGE menu.

This option requires that all information

be entered from the keyboard rather than from an input file. The following will be displayed.



CHANGE a coordinate value to another projection (PROJECT)

***** Welcome to the Projection Utility *****

Send output to file (F), screen (S), or printer (P) ? F

You may select (S) for the results of your reprojections to be written only to the screen, or (P) to have them sent directly to the printer. (Be sure your printer is on line and ready to print.) If you select (F), the default, you will be prompted to

Enter point output filename:

You may accept the default output filename (POINT.OUT) or enter a name of your choice. If either POINT.OUT or any other name you specify already exists, you will be given the option of over-writing or appending to the existing file or entering another name.

Next you will be asked to

Select Source projection:

- 0) Geographic Latitude and Longitude***
- 1) Universal Transverse Mercator***
- 2) State Plane Coordinates***
- 3) Albers Conical Equal Area***
- 4) Lambert Conformal Conic***
- 5) Mercator***
- 6) Polyconic***
- 99) Exit***
- ?***

As described in the previous sections, specify the projection of your source data and provide projection parameters if requested. Then a menu for destination projection will be displayed.

Select Destination projection:

- 0) Geographic Latitude and Longitude**
- 1) Universal Transverse Mercator**
- 2) State Plane Coordinates**
- 3) Albers Conical Equal Area**
- 4) Lambert Conformal Conic**
- 5) Mercator**
- 6) Polyconic**
- 99) Exit**

?

After you specify a target projection, you may again be asked to provide projection parameters. Then a summary of your selections will be displayed and you will be asked to

Choose an option:

- 1) Project a point**
- 2) Redefine projection parameters**
- 3) Exit**

? 1

Choose option 2 to go back and correct mistakes, or 3 to return to the QMUtil ENTER/CHANGE menu. If you choose to continue with the process by selecting option 1, the next prompt will be

Longitude:

Enter the X coordinate of your data point. You may use the QuickMAP editing keys to correct mistakes. Then, enter the

Latitude:

or Y coordinate of your data point. The reprojected coordinates will be written to the screen, printer, or output file specified previously, and then you will be asked

Project ANOTHER POINT using the same projection parameters? Y

You may continue reprojecting coordinates by answering Y(es) each time this prompt appears. When you are finished, or wish to change to different source and/or target projections, answer N(o). This will produce the

More Utilities? Y

prompt. Answer Y(es) to return to the QMUtil ENTER/CHANGE menu or N(o) to exit QMUtil and return to DOS.

Notes on Use of and Possible Problems with PROJECT

1. All projections based on Clarke's 1866 Ellipsoid and North American Datum of 1927 Geodetic Controls.
2. Geographic (latitude/longitude) coordinates may be entered as degrees, minutes, and seconds (DMS) or as decimal degrees (DD) from the keyboard. They must be in decimal degrees in MOSS export files, so if entered as DMS, PROJECT changes the format to DD. DMS must be comma or space delimited integers with longitudes in the western hemisphere entered as negative degrees (e.g. -92,7,30).
3. False eastings and northings may not be negative values.
4. Because of the wide variation in projection parameters, invalid values are not always reported when entered. Rather, they may produce an error prior to or during computations. This and many other errors will exit to DOS after responding with an EXECUTION TERMINATED error.
5. When the destination projection is the same as the source but with different projection parameters, an intermediate re-projection must be done using a different projection (e.g. geographic).
6. One second precision is about 20-35 meters depending on latitude. Degrees to five decimal places provides precision to slightly less than a meter.
7. A longitude bordering 2 UTM zones (e.g. -96) specifies the zone to the east.
8. MOSS export files have no provision for storing projection parameters. These must be recorded on paper or in an associated file to reproject data at a future time.
9. Of the sample mapfiles distributed with QuickMAP, latitude/longitude data in the MANATEE, FLORIDA, and CRANE mapfiles were projected to Lambert with parameters: 33, 45, -96, 20, 5000000, 0. Data in the ARSENAL, and COLOBAT mapfiles were projected to UTM using Zone 13, and those in the BANANA mapfile to UTM Zone 17.

Appendices

Error Handling and Reporting

Problems with QuickMAP caused by improper installation

Several kinds of errors may occur during installation and use of QuickMAP that will prevent the program from running properly. Most of the problems encountered are due to improper installation of GEM or QuickMAP and can be easily fixed. Below is a list of the most commonly encountered problems and suggestions for how the user might solve them. This list is not meant to be exhaustive, but rather to serve as a starting point for error handling. If you have a problem not covered here, or not fixed by the suggested solutions, the last part of this section describes how to get technical help from the QuickMAP support people.

- **QuickMAP has been installed using QMSetup, but when I try to run the program the screen becomes a blank, white or light blue space (ie., enters graphics mode) but nothing else happens. Or it may never enter graphics mode. It may terminate in text mode by displaying the following messages:**

***Remove QuickMAP's Environment and Return to DOS . . .
Number of installations: 1***

Press ENTER to remove, ESC to abort

When you press [ENTER], you are returned to the DOS prompt.

This usually indicates that you do not have enough memory available in your computer to load all of QuickMAP - the minimum available memory required is about 570 k bytes. If this is your problem, you might consider upgrading to DOS 5.0. This version of DOS allows a variety of memory management "tricks" that, depending on your situation, can free up to 45k additional memory to run DOS applications. Other commercial memory management tools (eg., QEMM386 from Quarterdeck Office Systems) can be used to free up memory with older versions of DOS. In addition to these suggestions, you should also:

- 1.) Check your computer's CONFIG.SYS file. This file generally is found on the root of your hard disk and sets up the environment that coordinates various components making up your computer system. A typical CONFIG.SYS might include statements that define special drivers for various devices. Most of these drivers are not needed to run QuickMAP, but do reduce available memory. You should edit the CONFIG.SYS to remove things such as DEVICE=ANSI.SYS, DEVICE=MOUSE.SYS, SHELL=C:\COMMAND.COM, etc. Perhaps the easiest approach is to create a special CONFIG file for use with QuickMAP. Name it "CONFIG.QM". All it needs is the following:

**BUFFERS=10
FILES=20**

When you are going to run QuickMAP, from the root of your hard drive at the DOS prompt, enter

copy config.qm config.sys

Then reboot your computer. (You may also copy over your AUTOEXEC.BAT file with a special QuickMAP version before rebooting - see number 2 below.) If you follow this procedure, **BE SURE YOU HAVE A BACK-UP COPY OF YOUR ORIGINAL CONFIG.SYS FILE BEFORE COPYING OVER IT!** Your original CONFIG.SYS configures your system for the various applications you routinely use, and the special QuickMAP CONFIG file will not do the same thing. You could keep a copy of the original named something like "CONFIG.SAV". Then you should copy config.sav to config.sys and reboot to reset your computer for uses other than QuickMAP.

2.) Check your AUTOEXEC.BAT file. Like the CONFIG.SYS, the AUTOEXEC.BAT file is found on the root of your boot disk. It may load programs that become extensions to the DOS environment (ie., programs that Terminate but Stay Resident for immediate use on request). The AUTOEXEC.BAT should be made to complement CONFIG.SYS; it may be necessary to remove TSRs dependent on certain drivers and files that have been removed from the CONFIG.SYS. Again, you can create a special "AUTOEXEC.QM" version to be copied over AUTOEXEC.BAT before rebooting and running QuickMAP. But **be sure you have a backup copy of your original AUTOEXEC.BAT before copying over it!**

- **QuickMAP has been installed using QMSetup, but when I run it, the mouse cursor will not move, or is "jumpy."**

The mouse has not been properly installed. Usually this is due to specifying the wrong COM port, the wrong mouse driver, or improper parameters for the mouse driver command. First you should check to make sure that the mouse works properly with the GEM software. If it does not, run GEMSetup and correct any problems with the mouse driver and parameters. If the mouse works properly with GEM but not with QuickMAP, re-run QMSetup, select the 'CHANGE Current Setup' option, and change the appropriate mouse information. Also, if you use a mouse driver (eg. MOUSE.COM), you should make sure that its location is specified in your PATH statement. (See your operating system manual for information on the PATH statement.)

- **When I try to use the mouse to drop a menu, select a menu item, click on a button, etc., the computer beeps and may display 'Resident MOUSTOP.COM not found in memory' at the top of the screen.**

MOUSTOP.COM is a TSR program that helps QuickMAP control the mouse, and it has not been loaded. When QuickMAP is installed the command to load MOUSTOP is included in the QM.BAT file so the mouse driver is properly loaded each time QuickMAP is started with the 'QM' command. Make sure that the command

MOUSTOP 160

is in the Q.BAT. Also make sure that your path includes the location of the MOUSTOP.COM file.

- **When I enter the DRAW module, an alert is displayed that says 'INTRS232.COM NOT LOADED'.**

INTRS232 is a tablet driver that should be loaded by QM.BAT if QuickMAP was installed for a tablet. Usually, an inability to load INTRS232 means that the tablet is connected to a different COM port than the one specified during installation. Re-run QMSetup, select the 'CHANGE Current Setup' option, and change the COM port number. If you will not be using a tablet, the message may be ignored.

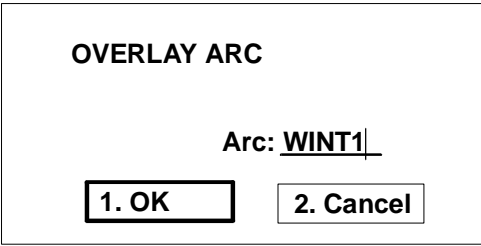
Problems caused by QuickMAP bugs

Because users sometimes put demands on QuickMAP that we have not thought to include in our standard testing procedures, you may discover a program bug. When this occurs, an error message usually will be displayed and the program will terminate. To help our programmers correct any problems as quickly as possible, we ask that you provide us with the information requested on a QuickMAP Bug Sheet. A copy of a QuickMAP Bug Sheet is included at the back of the User's Manual.

As an example of how to properly report a bug, suppose that you start QuickMAP and open the MANATEE mapfile in the Gallery. Then you go to the ASSEMBLY module and open the 'WinterDist' ID. It is drawn on the display. Next, you activate the 'View' menu and click on 'Overlay Arc'.

The dialog illustrated at right appears. You enter Wint1 as an arc name and click on '1. OK'. The dialog disappears, the computer beeps, writes a message to the screen, and terminates QuickMAP.

The message says:



OVERLAY ARC

Arc: WINT1

1. OK **2. Cancel**

**Argument list error in statement 2 line 3380
of ASSEMBLY.pgm**

Stop in statement 4 on line 1400 of QUICKMAP.pgm

Number of installations: 1***Press ENTER to remove, ESC to abort***

Fill out the Bug Sheet as illustrated on the following page, including as much information as possible. Additional information and comments can be written on the back of the Bug Sheet under "Description of the Problem."

There are also several error files that QuickMAP uses to help track problems. During installation of QuickMAP, "QMSetup.RPT" is written on the root directory of drive C, and may contain helpful information about problems with setup and configuration. An error file (Module-Name.ERR) is kept on the QMAP directory for each QuickMAP module. If an error occurs while using QuickMAP, check the error file for the module in use at the time. For example, if you find a "bug" while working in the ASSEMBLY module, the file named ASSEMBLY.ERR might have some information about the cause of the problem. So it may be helpful to send, along with your Bug Sheet, a copy of QMSetup.RPT, one of the .ERR files, or even your CONFIG.SYS and AUTOEXEC.BAT files.

Mail or Fax the Bug Sheet and additional information to:

**QuickMAP User Support
NBS 4512 McMurry Avenue
Fort Collins, CO 80525-3400**

**Fax Comm. (303) 226-9230
Fax FTS 323-5230**

We appreciate your cooperation.

QuickMAP Report

Name: Joe User Date: 08/09/91
Phone: (303) 555-1729

Pathway leading to the Problem:

Module: ☐ Gallery ☐ Display
☒ Assembly ☐ Draw ☐ Utilities

Menu: View Menu Item: Overlay Arc

☒ Dialogue Title/Description: Overlay Arc
☐ Alert _____

Diagnostics:

Program Error Message: _____
Argument list error

Statement Number: 2

In Line number: 3380

of Package (.pgm): Assembly

Information in Use

Mapfile: Manatee

ID: Winterdist

Arc: Wint1

Other files: _____

RGD May 1990

How to exit QuickMAP when a problem occurs

When a problem occurs due to a bug or improper installation of QuickMAP, you may be automatically returned to DOS via the QM.BAT file. This appropriate termination of QuickMAP is indicated by the return to text mode and the following messages being displayed:

Remove QuickMAP's Environment and Return to DOS . . .

Number of installations: 1

Press ENTER to remove, ESC to abort

at which point you would press < ENTER> to remove the TSRs installed by QuickMAP and would be returned to the DOS prompt.

Sometimes, however, a bug or problem will terminate QuickMAP but not return properly to DOS text mode. An error message will usually be printed on the screen, followed by the termination messages mentioned above. But the computer will still be in graphics mode - the QuickMAP screen will still be visible on the display and when you press ENTER to remove the TSRs, messages will be printed in special ASCII characters. If this happens, type

fini

(even though you will not recognize it on the screen in ASCII code) and press <ENTER>. You should then be returned to text mode and the DOS prompt.

Some of the mapfiles you use with QuickMAP may be rather complex, and certain QuickMAP functions (such as filling a large, complicated polygon with a DISPLAY pattern) will take a long time. When the program is busy with a time-consuming task, the mouse cursor may be replaced by an 'hourglass cursor' until the task is complete, or there may be no cursor visible on the screen. If the task takes a very long time, you may think that QuickMAP is hung up and may try to check by moving the cursor. With some slower computers and some mouse drivers, moving the mouse when the hourglass cursor is on the screen will disrupt QuickMAP's graphics display, giving unpredictable results. Colors or patterns may "bleed" across the screen with any subsequent mouse movement. This effect can sometimes be stopped by moving the mouse cursor up to the menu bar and clicking on any menu item. The best way to stop the effect and clean up the display is to exit QuickMAP and start over.

Occasionally, a bug will "hang" QuickMAP, ie., the program will not run and the mouse will not be functional, but there will be no error message or exit. In this case try pressing CTRL-C: hold down the CTRL key and press the C key at the same time. This should get you out of QuickMAP but remain in graphics mode, so you will need to use "fini" as described above.

If a bug "hangs" not only the program but also your computer - ie., not even a CTRL-C works and all else fails - you will have to reboot to exit. When either a CTRL-C or a reboot is necessary

to quit QuickMAP, any work done during the current session that has not been saved will probably be lost, but it is unlikely that the original mapfile will be harmed. In any event, it is important to periodically back up your mapfiles, or risk losing the work involved in creating and maintaining them.

Backing up QuickMAP data files

Now that it is so easy to create mapfiles using QuickMAP, you may be accumulating a large amount of data, requiring increased storage space. A good way to substantially reduce the amount of disk space needed for data storage is to use an “archiving” utility, several of which are available as “shareware” or public domain software. If you make a habit of frequently backing up your mapfiles into an archive, a minimum of effort and disk space can prevent the loss of important data and hours of work.

For example, using the utility "PKware" you could use a simple batch file like the following to automatically back up your mapfiles prior to editing or at the end of each QuickMAP session.

MAPBACK.BAT

```
c:
path c:\util;c:\c:\qmapdb
pkzip -bc: a %1 %2.qm?
```

You can create this or a similar batch file using an editor or word processing package and put it on the directory containing QuickMAP. To run the batch file, enter its name (without extension) followed by two parameters that will be explained below. For example, if you had just finished changing the MANATEE mapfile you might enter:

MAPBACK A:MANATEE C:\QMAPDB\MANATEE

This assumes that the batch file is located on the directory where you are currently working and that the MANATEE mapfile, or database, is stored on a directory named QMAPDB. This would compress all the MANATEE data files into a single file named Manatee.Arc and store the archive file on the floppy disk in drive A.

A little more detail on how the batch file works will help you modify it to suit your needs.

path c:\util;c:\c:\qmapdb

- drives\directories where all programs and files needed to run the batch file can be found. In this example, the PKzip program of PKware is on the UTIL directory, so "util" must be included in the path. The QMAPDB directory contains the MANATEE data files created by QuickMAP. You might substitute another drive and/or directory name for where your mapfile data is stored.

pkzip -bc: a %1 %2.qm?

- "pkzip" starts the archiving program, and "-bc:" tells it to use the c: drive for work space, to make sure there is enough room for the intermediate files PKzip creates.

- "a" tells it to add (compressed) files to a newly created or existing archive. Files with the same name will overwrite those already in the archive.
- For %1, whatever you entered as the first parameter when you invoked the batch file is substituted; in the example, %1 = A:MANATEE. This name will be used for the final archive file; PKzip will automatically add the '.zip' extension and will place the file on the A: drive.
- For %2, the second parameter you entered will be substituted; in the example, %2 = C:\QMAPDB\ MANATEE. The "qm?" tells it to archive all files having extensions starting with "qm" and having any character accepted by DOS in the third position; this will take care of all the files comprising a QuickMAP mapfile.

PKzip will issue a start-up message and, as it works, it will issue a message giving the name and percent compression for each file it adds to the archive. Mapfiles are typically compressed by 30% to 60% with PKzip. When the process is finished, you will be returned to the DOS prompt.

Should the time come when you must use your archived data files, PKware will extract, or reconstruct, the files for you. The command, at the DOS prompt, would be something like:

PKUNZIP A:MANATEE C:\QMAPDB

PKUNZIP starts the "unarchiving" utility. "A:MANATEE" gives the location and name of the archived file. (The program assumes the file has a .ZIP extension, and if created by PKzip, it will have.) "C:\QMAPDB" gives the destination directory for the reconstructed files; the original individual file names will be reconstructed along with the data.

The PKware utility offers many other options to suit a variety of file backup needs; refer to the documentation provided with the utility for further information.

The archiving utility used to make the distribution files for QuickMAP is LHARC. The LHARC command equivalent to the one listed previously for backing up data files using PKZIP is:

LHARC A /WC: %1 %2.QM?

This command will add (A) data files to an archive file, creating the necessary intermediate working files on the C: drive (/WC:). The %1 and %2 parameters are used as before when a batch file is invoked. %1 is the name of the archive file. %2.QM? means to add all files with the name provided as the second parameter and the extension .QM?, where the ? can be any character. For example, the command

LHARC A /WC: MANATEE MANATEE.QM?

would create an archive called MANATEE.LZH containing the files MANATEE.QMA, MANATEE.QMI, MANATEE.QMT, and MANATEE.QMV, which together comprise the MANATEE mapfile.

Also, there are other “free” archiving utilities available on bulletin boards, etc. This simple example is an attempt to encourage you to protect your QuickMAP data by frequent backup.

Customizing QuickMAP's On-Line Help

If you have additional information or instructions that would be helpful for your individual use of QuickMAP, you can include them in the On-Line Help facility. A special location has been reserved for the user to customize HELP. It is called "User Info" and is in the 'Other Items' list of the main help screen.

The first step in the customizing process is to enter the desired text into the appropriate file using a word processing program or screen editor. There are four text files that contain the help information that appears on the QuickMAP help screens, one for each program module. They are ASSEMBLY.HPS, DISPLAY.HPS, GALLERY.HPS, and QMDRAW.HPS (for the DRAW module).

Note!! Before you begin to modify the QuickMAP Help files, be sure you have a backup copy of the four .HPS files mentioned in the preceeding paragraph and of the four corresponding .HPR files.

Select the appropriate .HPS file for the module from which you want the help available. For example, use DISPLAY.HPS to make information available from the Display module's main Help screen. If you want the information available in more than one module, you will have to repeat this process for each one. Bring the selected .HPS file into a word processing or full screen editing program. Note that the .HPS files are "ASCII text" (sometimes referred to as "DOS text") files. Your particular word processor or editor may require some conversion process when entering an ASCII file or when saving the file after you have completed your additions, to add or remove special formatting codes used by the word processor. Consult the documentation supplied with the word processing package or editor for information about transferring ASCII text files.

Go to the end of the .HPS file and begin making your additions there. For each "item" to be added to the 'User Info' list, a separate entry is required. On the next page is an example of the format that must be followed for entries in QuickMAP's .HPS files. The first line is an identification line. Its first three spaces contain "&&&".

Spaces 5 through 24 of the identification line contain a name you give the entry; the name should have a length of 20 or less, including characters and blank spaces. Each name must be unique; do not repeat any of the names already used by QuickMAP's HELP and do not repeat any names already used if you have previously customized HELP. When determining if a name is unique, QuickMAP considers capital letters to be different from their lower case equivalents. (So "map" and "MAP" would be unique entries.)

Positions 26 and 27 of the identification line contain the page number for the entry, starting with a "0" for the first page. A "page" here refers to space on the Help screen, and must be 17 or less lines in length. Most help items will require only one page, but note the format below for continuation onto additional pages.

[illegible]

&&& Name of Item	1
------------------	---

and, beginning on the line immediately following it, enter the names of your custom Help entries, one name per line. Each name must be entered exactly as it was entered in the .HPS file, except that it should start in the first space and should be the only thing on the line. (There should be no "&&&" and no page number on the line.)

When you have finished adding all of your 'Other Items' names, save the .HPR file as ASCII text.

The final step in customizing Help is to run a program that "pre- processes" the help files to make sure they are in the form required by QuickMAP. The program was copied to your QMAP directory by QMSetup when QuickMAP was installed. To run this pre-processing program, start by entering at the DOS prompt (in the QMAP directory):

HelpPre

A brief description of the program will be displayed and then:

Enter Help Screen Filename (.HPS file)

Enter the name of the .HPS file you have modified (Assembly, Display, Gallery, or QMDraw). Next you will be given a default drive and directory where HELPPRE will expect to find the QuickMAP help files. You can accept the default by pressing <Enter> or you can use the editing keys to enter a different drive\directory indicating where your QuickMAP package is located.

The next prompt will be:

Write error messages to:

- 0 screen (default)***
- 1 printer***
- 2 disk (filename = Help.Err)***
- ?***

Enter the menu item number for where you want the error messages sent. It is convenient to have them written to a disk file or printer, so you have a permanent copy to refer to if further modifications are needed.

When asked for a '***Resource Variables Filename***', select the default by pressing <Enter>. For our purposes the default, which is the same as the modified .HPS and .HPR filenames, will always be the correct selection. Again you will be given a default drive\directory for the location of your QuickMAP program files. The default should be set to the one you supplied earlier and can now be selected by pressing <Enter>.

When asked to

Enter menu tree number

select the default by pressing <Enter>.

Messages will be displayed as the .HPR file is processed and the .HPA file created. The program will stop and again ask you to confirm the default drive\directory. If the default directory was correct at the start of processing, or if you entered the correct one at the previous prompt, all you should have to do now is press < Enter> to confirm. Finally,

Finished

will appear to signal completion of the process.

Now you must check the error file that was sent to the printer or to the disk file "Help.Err", to confirm that the processing was successful. For each error found, a description of the error, the name of the file in which it occurred, and its location (line number) within that file are given. Using your editor or word processing program, correct any errors. Then run the HELPPRE program again. Repeat the process as many times as needed until no errors are reported. Your new on-line help entries should then be available in the appropriate QuickMAP module.

Glossary of Special Terms Used in QuickMAP

Alert - a message displayed on the screen by QuickMAP, providing information about the consequences of an action about to be taken. For example, an alert might warn that the changes made to a mapID during an editing session are about to be lost if the user chooses to 'Quit' without first saving the ID. The user must respond to the Alert before QuickMAP will allow him to continue.

Arc - one or more points that are often connected by straight lines

Arc direction - a topological property that indicates the order in which individual points are displayed and connected when part of a polygon or line feature. Direction is initially defined as the order in which the points are digitized. This may be changed by reversing the direction when an arc is assembled into a mapID table.

Attribute - a particular characteristic of a group of map features, such as "wetland" or "upland."

Base Parallel - The latitude on the central meridian chosen as the reference point for the map projection's origin.

Baud Rate - a communication parameter indicating the speed at which data is transferred between the computer and a device such as a digitizing tablet.

Bit Image - refers to the way an image is often displayed in a computer by setting the color value of each cell in a large grid. This type of data is often referred to as raster data. The advantage over vector data is that complex maps display much faster. Its disadvantage is that it typically requires more disk space than vector data does for a comparable resolution and linear and point features are represented as discrete areas. QuickMAP images are device dependent and intended for use only within QuickMAP on the computer which created them.

Buffer - an area of internal memory set aside as a workspace. Draw uses a buffer to store arc coordinates during certain edit tasks, e.g. 'Insert Before.' QuickMAP also uses buffers when filling polygons and handling tablet communications.

Central Meridian - The longitude chosen to be parallel to the map projection's Y-axis.

Clipping - the mathematical process of determining when display data is outside the viewing area so it may be discarded. This is important when a metafile is 'OUTPUT' from QuickMAP so unwanted data doesn't reappear when annotating it in a drawing package such as Corel Draw.

Control Buttons - boxes displayed by QuickMAP on the screen, in dialogs and in alerts. The boxes are labeled with various choices the user may make, such as '1. OK', '2. Cancel', or '3. Retry'. Clicking on the box is the same as pressing a button that initiates that particular response. The numbers on the buttons (1, 2, etc.) indicate the function keys that may be substituted for clicking with a mouse on that button.

Coordinates - numeric values indicating the position in a specific frame of reference. QuickMAP uses a two-dimensional orthogonal coordinate system with X and Y axes of equal scale. The coordinate system may represent a specific map projection or an arbitrary coordinate system such as that defined by a digitizing tablet.

Dialog - a message displayed on the screen by QuickMAP, providing information and requesting responses from the user. The types of responses requested may include selecting from a number of control buttons, pressing a function key, or typing at the keyboard.

Digitize - convert graphical information into digital (finite number) information. An electronic digitizing tablet is often used in this process.

Digitizing Mode - the method used to input coordinates. QuickMAP's two most frequently used methods are by Mouse and by Tablet. Other methods would include entering coordinate values from the keyboard and importing coordinate values from a text file or database.

Dropdown Menu - a list of choices offered by QuickMAP. In each of the QuickMAP modules (ASSEMBLY, DRAW, DISPLAY, GALLERY), the names of several menus are displayed across the top of the screen. A menu is activated by resting the mouse cursor on top of the menu name until it appears in reverse video. The list of choices or menu items then "drops down" onto the screen below the menu name. A particular item is selected from a menu by clicking on its name with the mouse cursor.

Easting - The value on the map projection's X-axis. Some systems require a false easting to locate the projection's origin far enough west to eliminate any negative values.

Extents - the size of a feature or map, or more specifically the location of the smallest rectangle, or minimum bounding rectangle, which contains the feature.

Family - arcs that have been grouped together primarily to speed their assembly into sets. The family is identified by the alphabetical part of an arc name. For example, WATER1, WATER2, etc. are arcs in the WATER family.

Feature - a point, line, or bounded area on a map.

Function Keys - a set of keys assigned special purposes through software. QuickMAP uses function keys to select choices, e.g. 'OK' and 'Cancel,' within most dialogs.

GEM Metafile - a standard way of encoding graphic data and text so that it may be shared with many applications and displayed on different types of output devices such as monitors, printers, and plotters.

Hole - a closed geometric figure of three or more line segments, with a negative area.

Layer - attribute information related to a particular theme and, possibly, mapfile. For instance, Pinyon-Juniper and Sagebrush might be two classes in a vegetation layer or theme.

Mapfile - a geographic database that organizes arcs into mapIDs.

MapID - a geographic feature composed of points, lines, and areas such as fresh water springs, streams, and lakes.

Map Projection - A transformation of the earth's spherical coordinates onto a developed, or flattened, surface in rectangular coordinates.

Map Registration - process of adjusting a map or maps to a particular reference system. In QuickMAP, map registration adjusts the arcs of one mapfile to fit with the arcs of another mapfile.

MBR - minimum bounding rectangle represents the extent or location and size of the smallest rectangle which includes a particular feature, view, or map.

Meridian - A north-south line, or a line of constant longitude.

MOSS Export Format - a special text file format used to exchange attribute, coordinate, and topological information about geographic features.

Mouse Button 2 - the right mouse button by default used for frequently made selections, e.g. the default exit button choice in dialogs, and issuing a 'Save/ Next' in DRAW.

Node - a special type of point representing the juncture of two or more arcs.

Northing - The value on the map projection's Y-axis. Some systems require a false northing to locate the projection's origin far enough south to eliminate any negative values.

Outline - a closed geometric figure of three or more line segments, with a positive area.

Paper Tablet Menu - a menu for use while in "Tablet" digitizing mode, composed of all the menu bar and menu item choices available in the DRAW module.

Parallel - An east-west line, or line of constant latitude.

Point - a special type of feature represented by a single coordinate, and therefore having no length or area associated with it.

Polygon - an area feature bounded by an outline, and possibly enclosing other polygons (holes or islands).

QMAP Utilities - a collection of utilities for managing QuickMAP tasks, files, and data structures that are typically processing or keyboard oriented and, therefore, are implemented without the GEM graphical user interface.

Raster Image - a way of representing an image by defining the values of all cells within a grid. An alternative vector method defines only the points, lines, and boundaries of the elements in an image.

Scale - the ratio of two sets of measurements. On a map the numerator, or first number, represents the distance or units on the map, and the denominator, or second number, represents the comparable distance or units on the earth's surface.

Set - one or more arcs organized to represent an outline, hole, line or points.

Set Label - information stored in a map table that indicates the topology of features. Each set may only belong to one type of feature class, i.e, point, line or polygon; a polygon class must begin with an outline label and includes any sequential hole sets that follow; and a hole set must always follow an outline or another hole.

Source Control Point (SCP) - Point(s) on the map and digitizing tablet that correspond with points (TCPs) in the mapfile's coordinate system.

Source mapfile - refers to the mapfile being altered from one coordinate system to another during the Mapfile Registration process.

Standard Parallel - The latitude(s) where the map's projection provides true scale.

Tablet - an electronic device used for digitizing. A map is usually placed on the tablet and features of interest on the map are traced with a cursor or pen.

Tablet Registration - process of adjusting a map or maps to a particular reference system. In QuickMAP, tablet registration adjusts a map on a digitizing tablet to fit with the arcs of an existing mapfile.

Target Control Point (TCP) - Points in the mapfile's coordinate system used to fit map information (i.e., a paper map on a tablet) in another coordinate system.

Target mapfile - refers to the mapfile used to define the desired coordinate system during the Mapfile Registration process.

Topology - description of arc "type". Arcs in QuickMAP may be one of four types: outline, hole/island, line, or point(s).

TSR - **T**erminate but **S**tay **R**esident programs are a special class of programs used to provide additional features to the operating system and any executing program, or implement limited multi-tasking. GEM uses TSRs to provide its graphical user interface and manage device drivers for different graphic input and output devices. QuickMAP uses TSRs to clean up conventional memory for use by other applications and to handle tablet communications.

Unit - a standard measurement. QuickMAP uses units for distance and area measurements. Typically map coordinates in a known projection will have units of either meters or feet. QuickMAP allows the user to report these units in a variety of English (inches, feet, miles and acres) and Metric (millimeters, meters, kilometers, and hectares) units.

Window - the viewing area available to the user at any particular time. The “default” window, set automatically when QuickMAP is started, is defined by the minimum bounding rectangle of the currently open mapfile. The user can re-define the window by changing magnification factors or reference points, and can also change the way the window looks by altering display parameters such as colors, line types, fill patterns, and point symbols.

Sample QuickMAP Mapfiles and Description of their Contents

Some of the mapfiles described below were generated from DLG files and their corresponding Lookup tables that are offered as optional packages with the QuickMAP distribution set. For those mapfiles, the mapIDs were selected from many possible options during processing. New mapfiles with different mapIDs may be generated by obtaining the desired DLG package and using QuickMAP's DLG2QM utility and an edited Lookup table. Mapfiles included as a part of the QuickMAP distribution for which original DLG data are optionally available are: COUNTIES, STATES, FWSREG, FEDLANDS, WORLD and WRIVERS. The original DLG data for these are all in the USADLG package. In addition, QuickMAP mapfiles generated from the HYDRO and ECOREGIONS DLG packages are available separately. See the following section of the Appendices for a description of the HYDRO and ECO DLG data and the corresponding mapfiles.

ARSENAL

Contains information on prairie dog distributions and bald eagle telemetry studies at the Rocky Mountain Arsenal, Colorado. ARSENAL is in UTM projection. The following mapIDs are included in ARSENAL:

ARSBND - Arsenal boundary

BE120 - Bald Eagle (#120) home range (75%ile use area)

BE126 - Bald Eagle (#126) home range (75%ile use area)

BE69 - Bald Eagle (#69) home range (75%ile use area)

BE76 - Bald Eagle (#76) home range (75%ile use area)

BEP120 - Bald Eagle (#120) telemetry locations

BEP126 - Bald Eagle (#126) telemetry locations

BEP69 - Bald Eagle (#69) telemetry locations

BEP76 - Bald Eagle (#76) telemetry locations

PDFEB89 - Prairie Dog distribution in February 1989 (soon after plague outbreak)

PDOCT88 - Prairie Dog distribution in October 1988 (prior to plague outbreak)

PDSEP89 - Prairie Dog distribution in September 1989 (post-plague recovery and introductions)

BANANA

Manatee Mortality and Use in vicinity of Banana Creek and Merritt Island, Florida. BANANA is in UTM projection. The following mapIDs are included in BANANA:

DIANE - Locations of a tagged adult female manatee (S-10) monitored by satellite from Nov 1987 to Jul 1988

GYRO - Locations of a tagged adult female manatee (S-8) monitored by satellite from Dec 1986 to Jun 1987

LAND - Land features above mean high water (from NOAA's high resolution shoreline database)

MORTBB - Manatee mortality caused directly by boats or barges (from FL DNR dBASE files)

MORTOTH - Manatee mortality not caused directly by boats or barges (also includes animals whose cause of death could not be determined)

STUDYAREA - Parts of six USGS 7.5' quadrangles in the vicinity of Banana Creek and Merritt Island, FL

WATER - Estuaries and Open Water below mean high water (from NOAA's high resolution shoreline database)

COLOBAT

Distributions of several bats taken from Bats of Colorado, published June, 1984 by Colorado Division of Wildlife, Department of Natural Resources, Denver, Colorado. COLOBAT is in UTM projection. The following mapIDs are included in COLOBAT:

BGFREETAIL - Big free-tailed bat (*Tadarida macrotis*) collection sites

BIGBROWN - Big brown bat (*Eptesicus fuscus*) collection sites

BRFREETAIL - Brazilian free-tailed bat (*Tadarida brasiliensis*) collection sites

CALIFORNIA - California bat (*Myotis californicus*) collection sites

COLORADO - Colorado state boundary

FRINGEDMYO - Fringed bat (*Myotis thysanodes*) collection sites

HOARYBAT - Hoary bat (*Lasiurus cinereus*) collection sites

LONGEARMYO - Long-eared bat (*Myotis evotis*) collection sites

LONGLEGGED - Long-legged bat (*Myotis volans*) collection sites

LTLBROWN - Little brown bat (*Myotis lucifugus*) collection sites

PALLIDBAT - Pallid bat (*Antrozous pallidus*) collection sites

REDBAT - Red bat (*Lasiurus borealis*) collection sites

SLVRHAIRED - Silver-haired bat (*Lasionycteris noctivagans*) collection sites

SMALFOOTED - Small-footed bat (*Myotis leibii*) collection sites

SPOTTEDBAT - Spotted bat (*Euderma maculatum*) collection sites

TWNSBIGEAR - Townsend's big-eared bat (*Plecotus townsendii*) collection sites

WESTERNPIP - Western pipistrelle (*Pipistrellus hesperus*) collection sites

YUMAMYOTIS - Yuma bat (*Myotis yumanensis*) collection sites

In addition, each Colorado county boundary is represented by a mapID: ADAMS, ALAMOSA, ARAPAHOE, ARCHULETA, BACA, BENT, BOULDER, CHAFFEE, CHEYENNE, CLEAR-CREEK, CONIJOS, COSTILLA, CROWLEY, CUSTER, DELTA, DENVER, DOLORES, DOUGLAS EAGLE, ELBERT, ELPASO, FREMONT, GARFIELD, GILPIN, GRAND, GUN-NISON, HINSDALE, HUERFANO, JACKSON, JEFFERSON, KIOWA, KITCARSON, LAKE, LAPLATA, LARIMER, LASANIMAS, LINCOLN, LOGAN, MESA, MINERAL, MOFFAT, MONTEZUMA, MONTROSE, MORGAN, OTERO, OURAY, PARK, PHILLIPS, PITKIN, PROWERS, PUEBLO, RIOBLANCO, RIOGRANDE, ROUTT, SAGUACHE, SANJUAN, SANMIGUEL, SEDGWICK, SUMMIT, TELLER, WASHINGTON, WELD, YUMA

COUNTIES

Generated from the COUNTIES.DLG file which is part of the USADLG package, the COUNTIES mapfile contains county boundaries for the contiguous United States. See the description of the DLG file in the following section of this manual for more detail on the original data. COUNTIES is in Lambert Conformal Conic projection. There are 49 mapIDs (for the contiguous 48 states plus Washington, D.C.), each containing the boundaries for all the counties in a particular state. The IDs are named with the two character abbreviation for the state followed by "CO"; for example the ID entitled ALCO contains all the county boundaries for Alabama.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

CRANE

Observations of Whooping Cranes in seven Western States during recent years. WHOOPER is in an "Unspecified" projection. The following mapIDs are included in WHOOPER:

REFUGES - National Wildlife Refuges

STATES - Western State Boundaries (includes Arizona, Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming)

TOWNS - Major towns

USA - Continental United States boundary

WATER - Major rivers and reservoirs used by Whooping Cranes

FEDLANDS

The FEDLANDS mapfile was generated, using QuickMAP's DLG2QM utility, from the FEDLANDS.DLG file that is in the USADLG package. It contains federal agency and administrative boundary data for the conterminous United States and is in Lambert Conformal Conic projection. The FEDLANDS mapfile has eight mapIDs:

BIA - Bureau of Indian Affairs boundaries

BLM - Bureau of Land Management boundaries

DOD - Department of Defense boundaries

DOE - Department of Energy boundaries

FS - Forest Service boundaries

FWS - Fish and Wildlife Service boundaries

NPS - National Parks Service boundaries

PVT - Private ownership boundaries

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

FLORIDA

FLORIDA is in Lambert Conformal Conic projection. The following mapIDs are included in FLORIDA:

ALLSALVAGE - All manatee mortality from 1974 to 1988 identified by the carcass salvage program (from FL DNR dBASE files)

COUNTIES - Florida counties

DIANE - Locations of a tagged adult female manatee (S-10) monitored by satellite from Nov 1987 to Jul 1988

FLORIDA - Florida state boundary

MORTALITY - Adult female manatee mortality in 1987 and 1988 caused directly by boats or barges (from FL DNR dBASE files)

FWSREG

FWSREG was generated, using QuickMAP's DLG2QM utility, from the FWSREG.DLG file which is part of the USADLG package. It is in Lambert Conformal Conic projection and contains six mapIDs, FWSR1 through FWSR6, representing the six Fish and Wildlife Service regions' administrative boundaries.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

MANATEE

MANATEE is in Lambert Conformal Conic projection. The following mapIDs are included in MANATEE:

BOATMORT - Manatee mortality caused directly by boats or barges (from FL DNR dBASE files)

COPLANUNIT - Inter-inlet planning unit of Indian, Martin, and St. Lucie counties, FL

COUNTIES - Florida counties

FALLDIST - Manatees observed during aerial surveys in fall

FLORIDA - Florida state boundary

JEOPARDY - Locations of manatee "Jeopardy Opinions" made by the US Fish and Wildlife Service (through 1988)

OTHERMORT - Manatee mortality not caused directly by boats or barges (also includes animals whose cause of death could not be determined)

POWERPLANT - Manatee use of warm water effluent from powerplants

QUADBOUNDS - USGS 7.5' coastal quad boundaries in the inter-inlet planning area

SPRINGDIST - Manatees observed during spring-time aerial surveys

STUDYAREA - Window on three county Inter-inlet planning unit

SUMMERDIST - Manatees observed during aerial surveys in summer

VERO - Vero Beach, FL USGS 7.5' quad boundary

VEROWATER - Estuaries and Open Water below mean high water in the Vero Beach 7.5' quad (from NOAA's high resolution shoreline database)

WARMSRING - Large fresh water springs used by manatees

WINTERDIST - Manatees observed during aerial surveys in winter

REFUGE

REFUGE is in the UTM projection. There are no mapIDs in REFUGE. It is included with the sample mapfiles for use in the Mapfile Registration exercise in chapter 3, and contains arcs that define the boundary of the Bosque del Apache National Wildlife Refuge in New Mexico.

STATES

The STATES mapfile was generated by QuickMAP's DLG2QM utility from the STATES.DLG file that is part of the USADLG package; more detail on the original DLG data is in the next section of this manual. The mapfile is in Lambert Conformal Conic projection and contains boundaries for the 48 conterminous United States plus Washington, D.C. The resulting 49 mapIDs are named with "ST" followed by the two letter abbreviation for each state; for example, STAL is the mapID with the boundary for Alabama.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

WORLD

The WORLD mapfile was generated using QuickMAP's DLG2QM utility and the WORLD.DLG file that is part of the USADLG package. More detail on the original data is available in the next section of this manual. The WORLD mapfile data are Latitude/ Longitude coordinates and represent a base map with country boundaries for the entire world. The data are assembled into seven mapIDs, each containing the country boundaries for a major world area: AFRICA, ANTARCTICA, AUSTRALIA, EURASIA, N_AMERICA, S_AMERICA, AND OTHER.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

WRIVERS

The WRIVERS mapfile was generated, using QuickMAP's DLG2QM utility, from the WRIVERS.DLG file that is part of the USADLG package. Data, representing major rivers of the world, are Latitude/Longitude coordinates. They are assembled into three mapIDs:

RIVER1 - permanent major rivers

RIVER2 - additional major rivers

RIVER5 - double line rivers (wide rivers not represented as polygons)

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

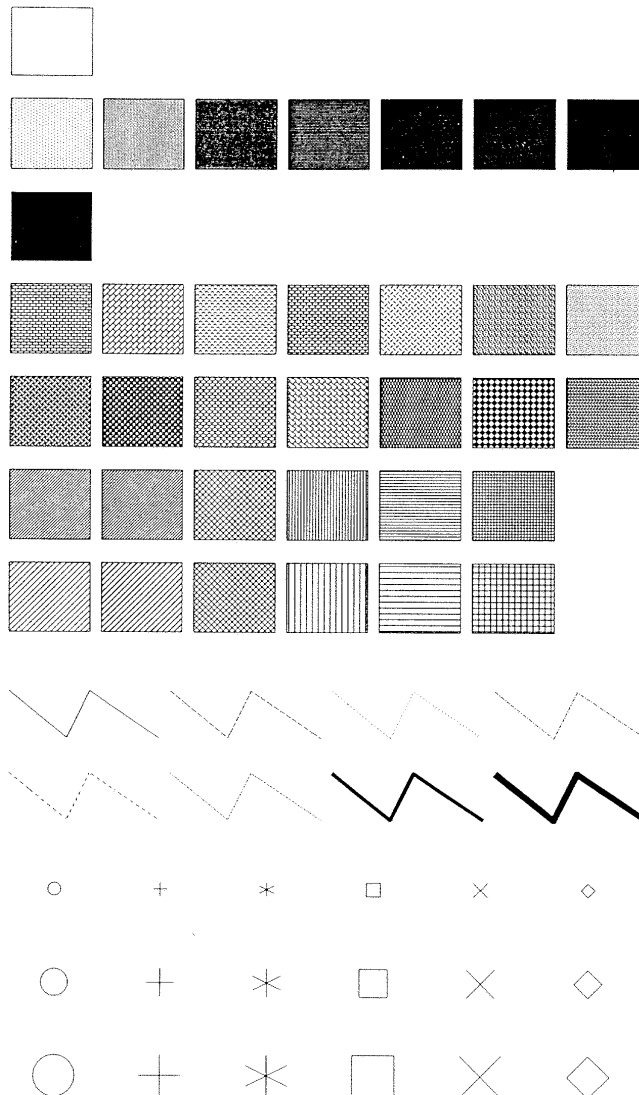
QMATTRIB

No projection is specified for QMATTRIB. It is a special mapfile to help determine how various combinations of output devices and software (word processing and graphics packages) reproduce the metafiles generated for output by the QuickMAP DISPLAY module. The QMATTRIB Map List, when opened in DISPLAY, reproduces the fills, line styles, and marker types selectable from the DISPLAY Toolkit (illustrated below.) You may use the QMATTRIB mapfile to experiment with the fidelity of graphics conversion processes. The following mapIDs are included in QMATTRIB:

FS_0 through FS_16 and FS_19 through FS_36 - boxes for the 35 fill styles available from the DISPLAY Toolkit.

LT_1 through LT_6, LT_9 and LT_11 - line types from the Toolkit.

MT_1/MS_1 through MT_6/MS_3 - six marker types (point symbols) in three sizes.



Data on the QuickMAP Distribution DLG Data Disks and Corresponding Mapfiles

Several sets of DLG Optional Format Level 3 data are offered as additional packages with the QuickMAP distribution to include or distribute with your application specific projects. Any of these DLG files may be imported into QuickMAP using the DLG2QM utility. These data were originally created by various Federal agencies and subsequently edited and re-projected by the National Biological Survey's Midcontinent Ecological Science Center (MESC). Designed for data interchange, the DLG-3 optional format allows for the simple creation of a vector data structure. The topological linkages are explicitly encoded for node, area, and line elements. The detailed description of the DLG-3 optional format may be found in "Digital Line Graphs from 1:2,000,000-Scale Maps, Data Users Guide 3" (1990).

Polygons or lines having major-minor codes with extended attributes are provided in separate files with both LUT (text lookup table) and DBF (dBASE III+) file extensions. These files generally contain an additional ten character code suitable for a QuickMAP mapID and may contain related descriptive information. The Lookup tables may be used as they are, or edited to select specific areas or map features to import. For example, you might edit the STATES.LUT to include only the information for states in a specific region of the U.S. and then create a corresponding QuickMAP mapfile using DLG2QM with your edited Lookup Table. In many cases, a file with extension .DBF is also included, and is a dBASEIII+ file that contains the same fields as the .LUT, but may also have additional information. This database may be examined, supplemented, queried, sorted, and reported with any database manager that uses the dBASEIII+ format. This offers an alternate way to create a lookup table and extract data from the DLG files when importing into QuickMAP.

The DLG data are grouped into four packages for distribution: USA DLG, ECOREGNS DLG, HYDUNITS DLG, and HYDFEATR DLG.

For all conterminous United States data (i.e., all except those representing world maps), the coordinate units are in meters geo-referenced to:

Lambert conformal conic projection
1st standard parallel: 33 deg 00 min
2nd standard parallel: 45 deg 00 min
Longitude of central meridian: -96 deg
Latitude of origin: 20 deg
False easting: 5000000
False northing: 0
Nominal geographic accuracy: 1000 meters
Equatorial radius: 6,378,206.4 meters
Polar radius: 6,356,583.8 meters

Table 1. List of DLG data sets and the agencies providing original source materials

File	Description	DLG Set	Agency
COUNTIES.DLG	County boundary base map for conterminous U.S.	USA	USGS
ECOREG.DLG	Major ecoregion boundaries	EcoRegns	EPA
ECOTYP.DLG	Most typical areas of ecoregions	EcoRegns	EPA
FEDLANDS.DLG	Federal agency and administrative boundary map for conterminous U.S.	USA	USGS
FWSREG.DLG	FWS administrative boundaries	USA	FWS
HUCST.DLG	Hydrologic cataloging unit boundaries	HydUnits	WRD
HUREG.DLG	Hydrologic accounting unit boundaries	HydUnits	WRD
HYDROL.DLG	Linear hydrography features	HydFeatr	USGS
HYDROP.DLG	Polygonal hydrography features	HydFeatr	USGS
LRAREG.DLG	Major land and resource area boundaries	EcoRegns	SCS
STATES.DLG	State boundary base map for conterminous U.S.	USA	USGS
WORLD.DLG	Country boundary base map for world	USA	CIA
WRIVERS.DLG	Major rivers of the world as linear features	USA	CIA

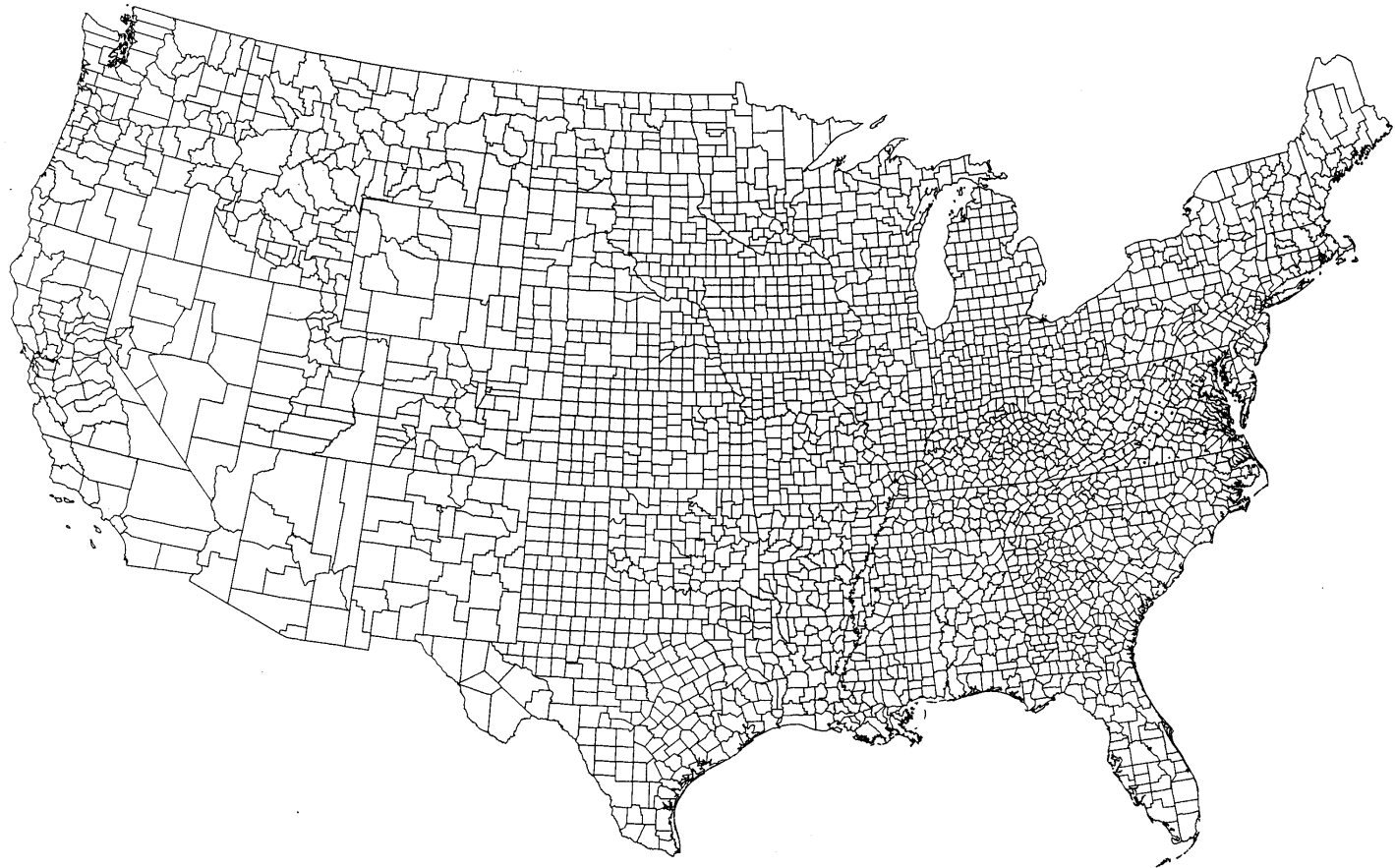
USA DLG

DLG files included in the USA DLG set are briefly described in Table 1; they are COUNTIES.DLG, FEDLANDS.DLG, FWSREG.DLG, STATES.DLG, WORLD.DLG, and WRIVERS.DLG. The corresponding QuickMAP mapfiles are included as part of the QuickMAP distribution package and are described in the Appendix 'Sample QuickMAP Mapfiles and Descriptions of their Contents.'

The original State and County data were from The National Atlas of the United States of America (USGS) at a scale of 1:2,000,000. Original USGS sectional maps were completely revised in 1972-73. Selected information was further revised at various times during 1979 and 1980 by USGS. NERC merged digital files for conterminous USA, corrected topological problems, and added additional attribute information during 1989 and 1990 while working on various GIS projects using ARC/INFO. Coordinates were weeded using a 500 meter threshold to appropriately generalize boundaries at this scale.

The Lookup table for STATES.DLG contains the following on each line: FIPS code for the state in the major field; a zero minor code; a MapID name ending with the two letter postal abbreviation (i.e. STCO for Colorado); and the full state name. The COUNTIES.LUT contains: the FIPS code for the state (in major field) and county (in minor field); a MapID name with the two letter postal abbreviation followed by CO for county and ending with the county FIPS code (i.e. ALCO3 for Baldwin county, Alabama); and the full county name. The FWSREG Lookup table has: the region number in the major code field; a zero in the minor field; a mapID name (FWSR1 through FWSR6); and a field listing the two letter abbreviations for all the states in the region.







The original Administrative Boundaries for Federal Lands data were from The National Atlas of the United States of America (USGS) at a scale of 1:2,000,000. Original USGS sectional maps were completely revised in 1972-73. Selected information was further revised at various times during 1979 and 1980 by USGS. NERC merged digital files for conterminous USA, corrected topological problems, and added additional attribute information during 1989 and 1990 while working on various GIS projects using ARC/INFO. Coordinates were weeded using a 500 meter threshold to appropriately generalize boundaries at this scale.

In addition, NERC updated the Federal Lands data for BLM and FWS from the 1982 National Geographic Society map "America's Federal Lands" (scale 1:5,757,255), and the 1990 FWS directory of National Wildlife Refuges, and included information provided by the North American Waterfowl Management Plan on Joint Ventures in 1990 with private land owners drafted to a base map at 1:12,000,000. All parcels were intersected with state boundary information for selectively extracting regions from the lookup table when importing data into QuickMAP. No attempt was made to remove slivers resulting from merging data from different sources, scales, and generalized shorelines since they are within the tolerances expected at this scale. Others are forewarned if you need to clean up these oddities for your particular purpose. Finally, some FWS lands were sufficiently tiny so that they were represented as point features.

FEDLANDS.LUT, the Lookup table for FEDLANDS.DLG, contains polygon specific Major-minor codes and fields for: Agency with primary jurisdiction (Bureau of Indian Affairs, Bureau of Land Management, Department of Defense, National Forest Service, Fish and Wildlife Service [some sites are points], National Park Service, and Joint Venture private lands that are part of the North American Waterfowl Management Plan), State, Acreage, and Name of parcel (see description of FEDUSE.TXT for explanation of abbreviations specifying the type of each unit).

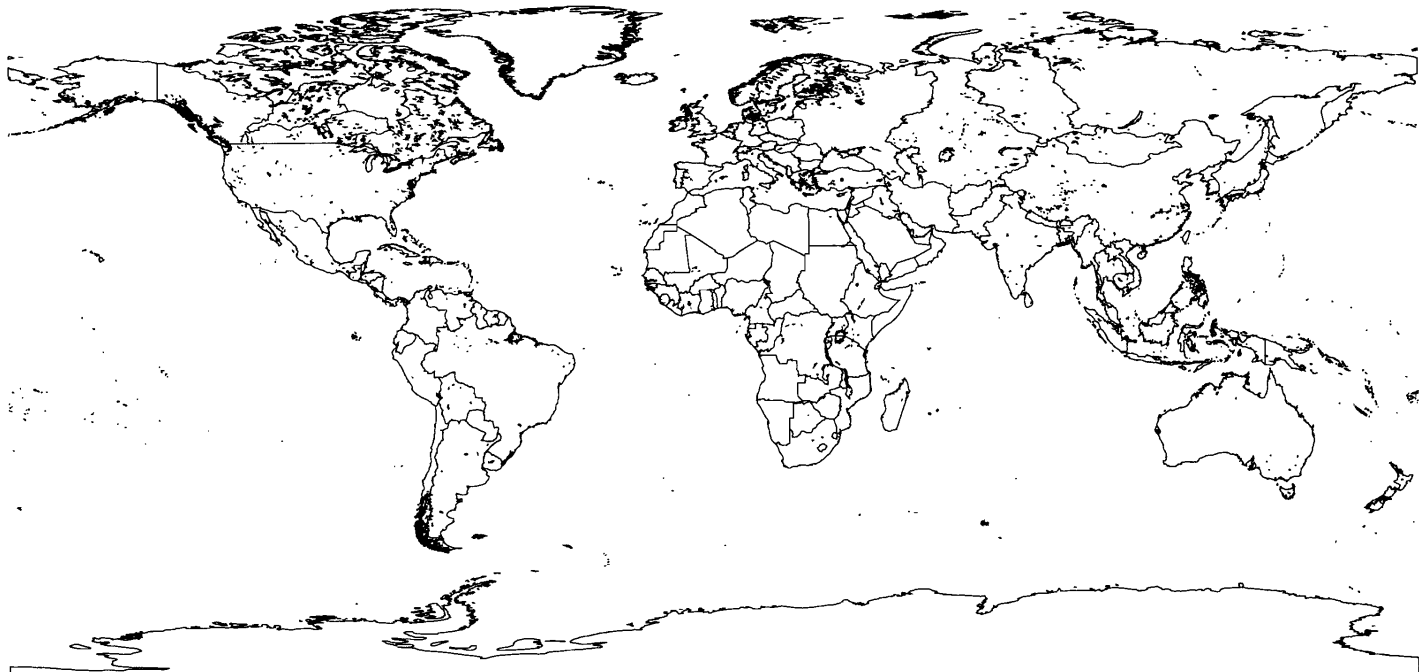
FEDLANDS.DBF is a dBASE III+ file containing the data in FEDLANDS.LUT plus additional parcel details including subdivision names of large parcels, parcels co-managed by another agency, name of co-managed units, and information about wilderness designations. Use this database to create your own lookup table such as those features in the DLG file designated as wilderness.

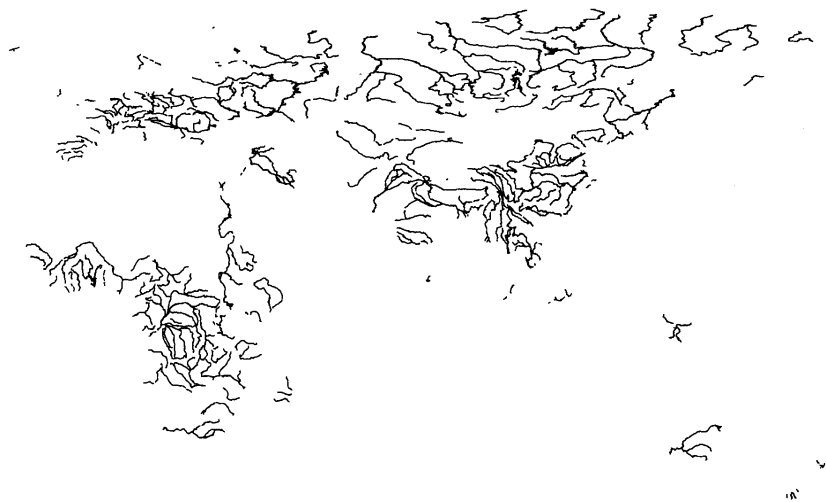
FEDLANDS.SUM is a text file that summarizes the number of parcels (polygons) and total number of acres in FEDLANDS.LUT and FEDLANDS.DLG by managing agency and state.

FEDUSE.TXT is a text file listing the abbreviations and frequency of occurrence for variously designated federal lands (i.e. Military Reservation, National Forest, National Wildlife Refuge, etc.)

The World DLG data are in Geographic coordinates, and units are in decimal degrees latitude and longitude (Western longitudes and Southern latitudes are negative). Nominal scale is 1:3,000,000 (affected by projection). Original source of the data was the Central Intelligence Agency's World Data Bank II modified from Environmental Systems Research Institute's PC World database suitable for wall-size maps. Note that this data extends to only 85 degrees north and south latitude







centered around the prime meridian. Keep in mind that some arcs will "wrap around" from the edge of the eastern extent to the western extent when using a different central meridian (other than zero).

WORLD.LUT, the Lookup table for WORLD.DLG, contains Major-minor codes, continent name, ten character MapID designation for country, and full country name. This Lookup table may be used to create a QuickMAP mapfile of the world with mapIDs corresponding to seven continent designations. Minor codes include 1 for land and 9 for water. In addition, a special minor code of 2 indicates an area (either land or water) that belongs to a certain country but for which the geographic location is not obviously associated with the country. For example, the Netherlands Antilles would have Netherlands as the country name, but are located off the coast of South America, and a minor code of 2 is used to highlight such peculiarities.

WORLD.DBF is a dBASE III+ file used to create WORLD.LUT. It has the same fields as the Lookup table, and may be used to generate other Lookup Tables that select for information specified in other fields and used to build MapIDs when imported into QuickMAP.

WRIVERS.LUT consists of Major-minor codes (minor always zero) and a MapID where RIVER1 = permanent major rivers, RIVER2 = additional major rivers, and RIVER5 = double line rivers (wide rivers not represented as polygons).

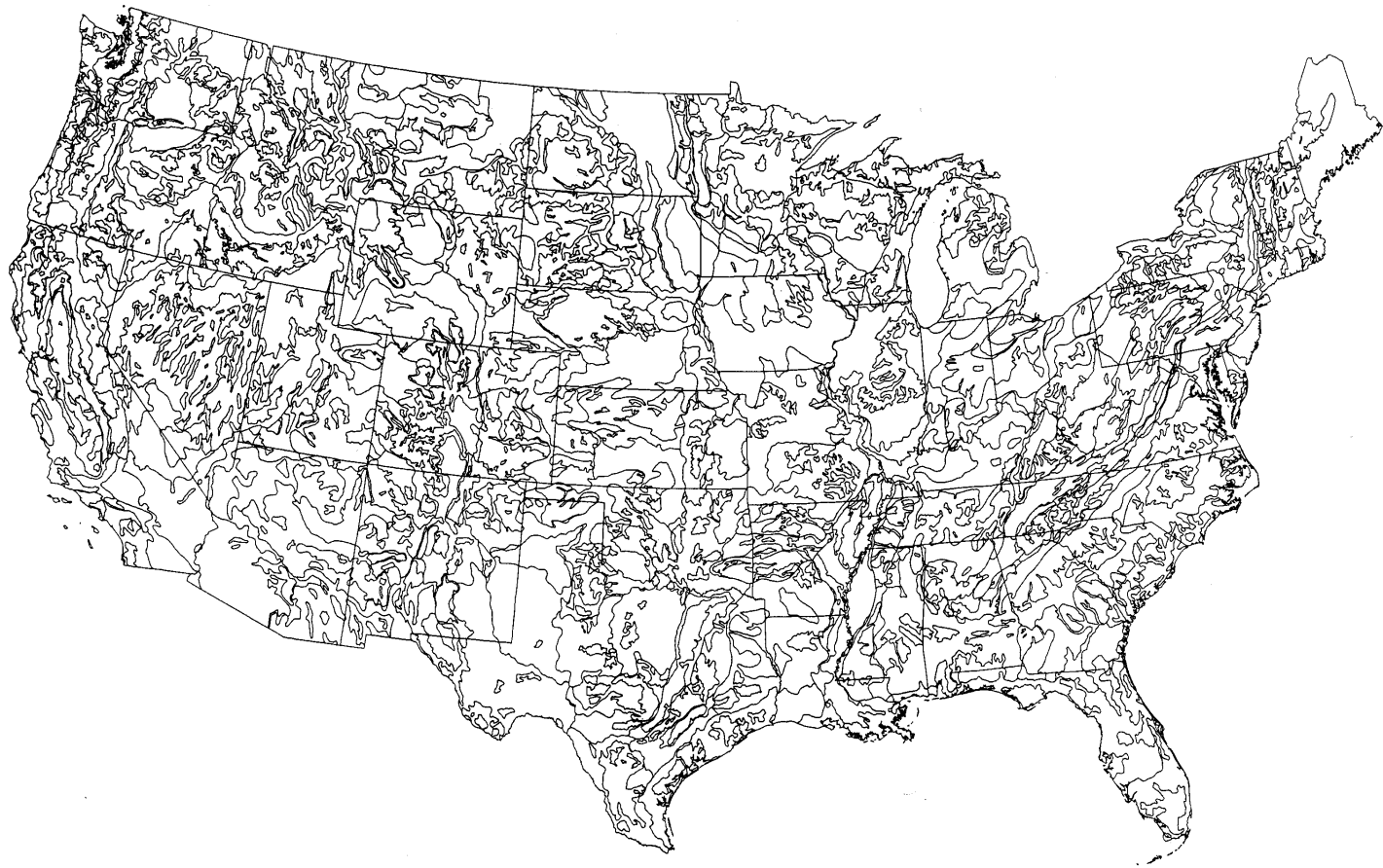
ECOREGNS DLG

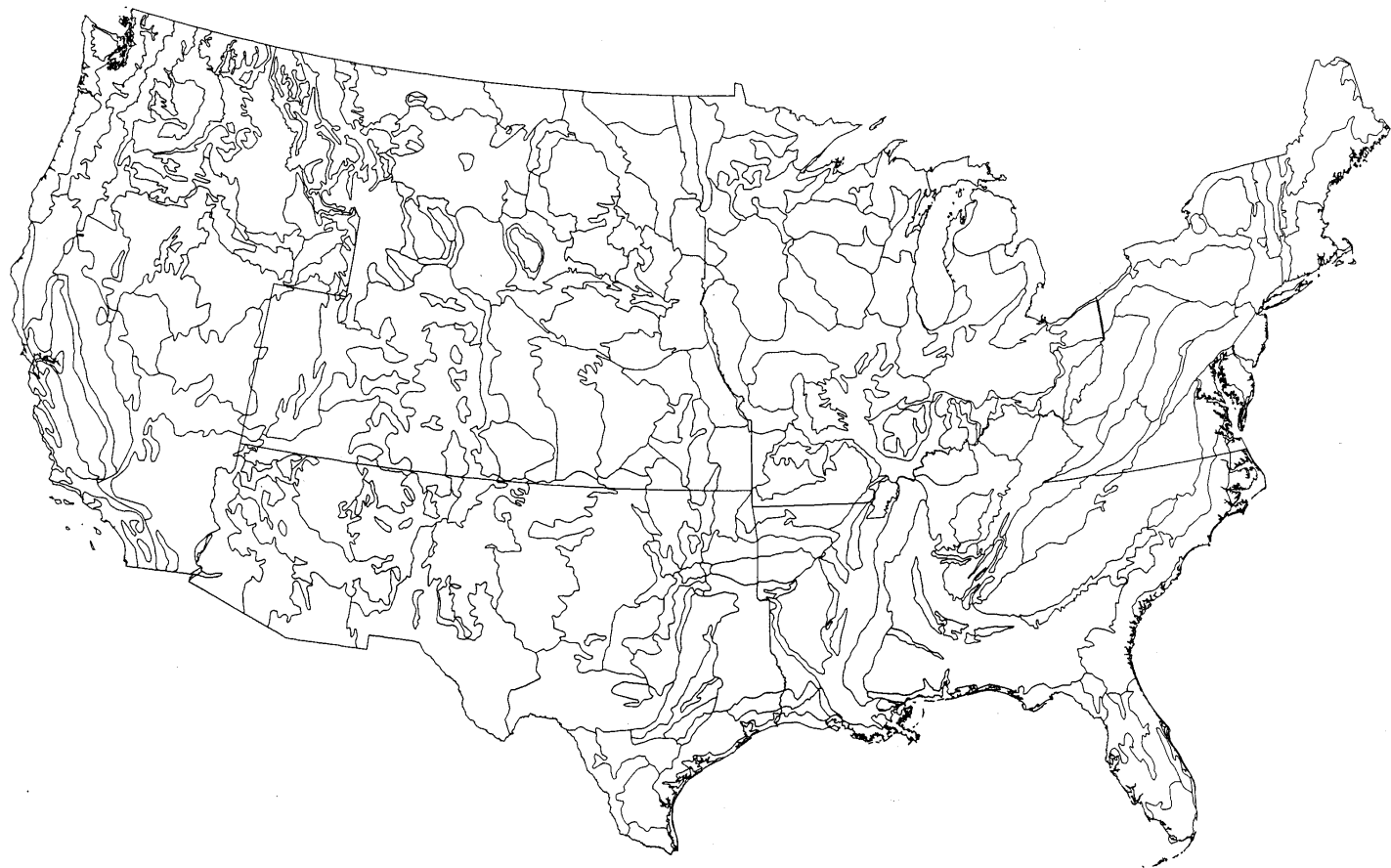
Two types of ecologic data are provided ----- Ecoregions as defined by the Environmental Protection Agency (EPA) and Major Land Resource Areas (MLRA) as compiled by the Soil Conservation Service (SCS).

The ecoregion data were originally digitized from "Ecoregions of the conterminous United States" map (Omernik, 1987). The ecoregion data set contains homogenous polygons defined from natural vegetation, land use, common soils, landform, and surface geology. The ecoregions were originally developed for use in water quality studies. Two versions of ecoregions are available. Both files (ECOREG and ECOTYP) identify the 76 regions in the major code and FWS administrative boundaries in the two least significant digits of the minor code. ECOTYP is further subdivided into those areas that are "most typical" (minor codes less than 100) and only "generally typical" (minor codes greater than 100) of the ecoregion.

MLRA were compiled and originally digitized by the U.S. Department of Agriculture Soil Conservation Service (1981). This data set represents areas with similar soil moisture and soil temperature regimes. This file (LRAREG) shows the land resource areas with unique polygon values that can be interpreted using the major minor codes in the related lookup table.







ECOREG Mapfile

The Ecoreg mapfile was generated, using QuickMAP's DLG2QM utility, from the Ecoreg.DLG file that is part of the EcoregNS DLG package described above. The mapfile is in Lambert Conformal Conic projection and contains 76 mapIDs representing the FWS administrative boundaries of 76 ecoregions defined by the Environmental Protection Agency. The IDs are named EcoregN1 through EcoregN76.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

ECOTYP Mapfile

The ECOTYP mapfile was generated, using QuickMAP's DLG2QM utility, from the ECOTYP.DLG file that is part of the EcoregNS DLG package described above. The mapfile is in Lambert Conformal Conic projection and contains 152 mapIDs. The IDs are based on the 76 Environmental Protection Agency ecoregions described for the Ecoreg mapfile above, but each region is further divided into areas based on how typical certain attributes are for the region. The attributes include natural vegetation, land use, common soils, landform, and surface geology. Those areas that are typical are assembled in mapIDs named ECOTYP1 through ECOTYP76, while non-typical areas are in IDs named ECOTYPN1 through ECOTYPN76.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

LRAREG Mapfile

The LRAREG mapfile was generated, using QuickMAP's DLG2QM utility, from the LRAREG.DLG file which is part of the EcoregNS DLG package described above. The LRAREG mapfile is in Lambert Conformal Conic projection. The data, representing areas with similar soil moisture and soil temperature regimes as defined by the Soil Conservation Service, are assembled into 181 mapIDs based on MLRA (Major Land Resource Area) codes.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

HYDUNITS DLG

DLG files included in the HYDUNITS DLG set are listed in Table 1. Data originated from the AVHRR Companion Disc distributed by the National Mapping Division of the US Geological Survey's Earth Resources Observation System Data Center (EROS). The cartographic boundary data sets on this disc are derived from USGS 1:2,000,000-scale DLG political boundaries and water bodies categories. The regional DLG boundary files were paneled and joined with coastline and shoreline data by the USGS's Water Resources Division (WRD). The hydrography vertices

were thinned using the Douglas-Peucker algorithm with a 1-Km tolerance. These data were further processed at the EROS data center to attain correct topology and attribute coding and to update county representations to concur with the most recent available information (nominally 1983). The NERC re-projected these data to conform with other data being distributed and reclassified selected hydrography data. Attribute data were further divided into multiple categories to facilitate user defined extraction and aggregation during the conversion process. The Lambert Conformal Conic projection was chosen for these data to correspond to USGS 1:500,000 state base maps and because of its visual presentation of the entire conterminous USA.

The hydrologic unit codes (HUC) data (Lanfear and Schornick, 1985) were digitized by the WRD from their standardized (FIPS) hydrologic unit maps at a scale of 1:2,500,000. There are 2,092 basins forming 18 aggregated regions that are used as administrative, as well as hydrographic water basin, units. The individual unit is identified with an eight-digit code where the first two numbers of the code identify the HUC region, the next pair the subregion, the third pair the HUC accounting unit, and the last pair the HUC cataloging unit. These HUC eight-digit codes are contained in the DLG file (HUCST) with the region, subregion, accounting unit forming the major code. The minor code then contains the cataloging units in the most significant two digits followed by a pair of digits indicating the state FIPS code in which the unit is located. A less detailed version of hydrologic units (HUREG) contains 333 accounting units and omits the cataloging units. The major code is as above and the minor code indicates the FWS administrative region in which the unit is located.

HUCST Mapfile

QuickMAP's DLG2QM utility was used to generate the HUCST mapfile from the HUCST.DLG file, which is part of the HYDUNITS DLG package. The HUCST mapfile is in Lambert Conformal Conic projection. The data represent hydrologic cataloging unit boundaries, all assembled in a single mapID named HYDROUNITS.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

HUREG Mapfile

The HUREG mapfile was generated, using QuickMAP's DLG2QM utility, from the HUREG.DLG file that is part of the HYDUNITS DLG package. The HUREG mapfile is in Lambert Conformal Conic projection. The data, representing hydrologic accounting unit boundaries, are assembled into a single mapID named HU.

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.





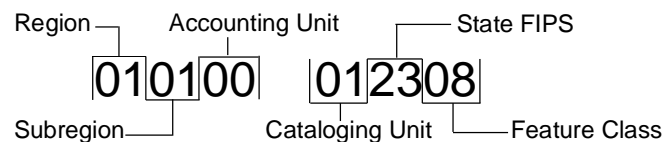
HYDFEATR DLG

Additional DLG hydrologic data represent the USGS 1:2,000,000-scale DLG data digitized from maps in the "National Atlas of the United States of America" (1970). The hydrologic data are distributed as two files, a stream network file of linear features (HYDROL) and a water bodies file (HYDROP). Major and minor codes are used to tag individual features to identify the hydrologic unit code and state in which it is found, and its feature class (Table 2).

Table 2. Hydrologic classes for linear and polygonal features.

CANAL	Canal	MARSH	Marsh (linear)	LAKED	Dry lake
CANALNAV	Navigable canal	RIVERA	Double-line river	LAKEI	Intermittent lake
COAST	Coastline	RIVERACL	Centerline for above	LAKEP	Permanent lake
DITCH	Ditch	RIVERB	Braided stream	LAKEPR	Reservoir
LAKEDL	Dry lake (linear)	RIVERI	Intermittent river	MARSH	Marsh (poly)
LAKEIL	Intermittent lake (linear)	RIVERP	Permanent river	SNOW	Snow (poly)
LAKEICL	Centerline for above	SNOW	Snow (linear)		
LAKEPL	Permanent lake (linear)	USBORDER	International border		
LAKEPCL	Centerline for above	WATERNAV	Inter-coastal waterway		

Specifically, the major code contains the six digit hydrologic unit code down to the WRD accounting unit. The minor code contains the WRD cataloging unit in the two most significant digits, the state FIPS code in the next two digits, and the feature class in the last two digits.



HYDROL Mapfile

The HYDROL mapfile was generated by DLG2QM from the HYDROL.DLG file that is part of the HYDFEATR DLG package described above. The mapfile is in Lambert Conformal Conic projection and contains data representing linear hydrography features for the contiguous United States. The data are assembled into the following mapIDs:

CANAL - canal

CANALNAV - navigable canal

COAST - coastline

DITCH - ditch

LAKEDL - dry lake

LAKEICL - centerline for intermittent lake

LAKEIL - intermittent lake

LAKEPCL - centerline for permanent lake

LAKEPL - permanent lake

MARSH - marsh

RIVERA - double-line river

RIVERACL - centerline for double-line river

RIVERB - braided stream

RIVERI - intermittent river

RIVERP - permanent river

SNOW - snow

USBORDER - international border for U.S.

WATERNAV - inter-coastal waterway

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

HYDROP Mapfile

The HYDROP mapfile was generated, using QuickMAP's DLG2QM utility, from the HYDROP.DLG file that is part of the HYDFEATR DLG package. It is in Lambert Conformal Conic projection and contains data representing polygonal hydrography features. The HYDROP mapfile contains the following mapIDs:

LAKE - dry lake

LAKEI - intermittent lake

LAKEP - permanent lake

LAKEPR - reservoir

MARSH - marsh

SNOW - snow

Included with the mapfile is a .QMM file (Map List for use in the DISPLAY module) listing all the mapIDs and a .GEM output file generated in the DISPLAY module using the Map List.

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Recent History of QuickMAP Improvements

From 09/18/89 to 11/17/89

- new section on "QuickMAP Utility for Accessing dBASE Files"
- Expanded installation notes include section on "QM.SYS". Installation notes now in Appendix A.
- Menu item added in the GALLERY: MapFile Info (in the Information Menu)
- Menu item added in ASSEMBLY: List IDs with Arc (Information Menu)
- Menu items added in DISPLAY: Open, Save, Save as, Abandon (Map Menu); Shift View (Display Menu); List Map Lists (Information Menu)

From 11/17/89 to 02/14/90

- Menu items added to DISPLAY: Make Group, Clear Group, Show Group (Edit Menu)
- Menu items added to DIGITIZE: Find Point(s) (replaces Find Next Point and Find Prior Point in View menu); Delete with Cursor, Delete with Keyboard (Modify Menu); Delete Point and Delete Range deleted from Modify Menu
- the dropdown Menus previously titled 'Display' in the ASSEMBLY and DISPLAY modules are now titled 'View'
- QuickMAP's on-line Help implemented in the ASSEMBLY and DISPLAY modules. (Previously available only in DIGITIZE.)

From 02/14/90 to 04/26/90

- OUTPUT from DISPLAY now offers choice of output device (screen or printer) and page orientation (portrait or landscape)
- printer OUTPUT from DISPLAY now more closely matches the size and proportions of the screen image
- the DIGITIZE module has been re-named "DRAW", and all references to it in menus, etc. have been changed

- Map Registration (in DIGITIZE/DRAW) now requires that the Target Arc (for TCPs) be on the screen before a registration is begun; also, no menu items (including HELP) can be accessed from within Map Registration.

From 4/26/90 to 12/04/90

- New QMSetup program that installs and reconfigures QuickMAP automatically.
- The QM.BAT and QM.SYS files have been changed as a result of the new setup program.
- The QM.BAT file for invoking QuickMAP now takes two optional parameters to automatically open a mapfile and go to a selected QuickMAP module.
- Chapter 1 of the user's manual has been rewritten to reflect addition of QMSetup for installation and changes in QM.BAT and QM.SYS.
- User's manual has been reorganized and some new sections added.
- On-line help implemented in GALLERY
- Information provided by the 'Mapfile Info' item in the GALLERY 'Information' menu is different.
- 'Export...' item in the GALLERY 'Utilities' menu exports 1 or more mapIDs or arcs and creates separate polygon, line and point files.
- 'Register Mapfile' item in the GALLERY 'Utilities' menu provides for the registration of one mapfile to another.
- 'Define Projection' item in the GALLERY 'Options' menu is implemented for Albers, Lambert, UTM, and 'Other' (unspecified) projections.
- 'Select Units' item in the GALLERY 'Options' menu implemented for DISPLAY; calculation results (area and distance) in DISPLAY are now reported in the user-defined units, provided the projection's scale and units are defined and correct.
- ASSEMBLY now handles mapIDs with an unlimited number of sets
- 'Save View' and 'Load View' items in the DISPLAY 'View' menu allow the user to quickly save and recall "background" screen displays of any complexity.
- Map List in DISPLAY now can be scrolled upward and downward for longer lists; its capacity is increased to 50 mapIDs.
- Maximum number of 'Groups' handled by DISPLAY is increased to 99.

- 'Map Registration' in the DRAW module is now called (more appropriately) 'Tablet Registration'.
- 'Cancel' button in the 'Delete with Keyboard' dialog (DRAW's 'Modify' menu) now works properly.
- TABLOOK utility has been revised; it now creates or updates the QM.SYS file based on user and tablet interactions. User's manual has additional information to help with installation of several types of tablets.
- More error trapping added to DRAW to report problems reading tablet parameter information in the QM.SYS file.
- IMPORT utility has been renamed "MOSS2QM" and now offers three options for how the arcs to be imported are specified. The documentation in the user's manual has been updated to reflect the changes.
- More error traps added to on-line HELP.

From 12/04/90 to 2/22/91

- Access to the QuickMAP utilities has been changed to a menu driven program called QMUtil. Part 5 of the User's Manual contains a new section explaining how to use QMUtil.
- A new utility, called DLG2QM, is available in QMUtil; it converts Digital Line Graph data to a QuickMAP mapfile. A new section in part 5 of the User's Manual explains how to use it.
- A "bug" was fixed that caused the system to lock up if no printer was on line when using the ChkArcs utility.
- A "bug" in the MOSS2QM utility was fixed that caused problems if an invalid directory was given in the path to the files being used.
- The ChkIDs utility no longer has the 'Read past End of File' problem.
- The 'Assembly Info' item of the ASSEMBLY menu in the Assembly module is now functional.
- The 'Merge IDs' item in the 'Modify' menu of the ASSEMBLY module is now functional, allowing the user to merge together the data in two or more previously created map IDs.
- The background pattern on the ASSEMBLY module screen has been changed so it does not interfere with viewing data, especially on lower resolution monitors.

- In the ASSEMBLY module, the function keys now work correctly in the 'Overlay Arc' and 'Overlay ID' items of the 'View' menu.
- A "bug" was fixed so that 'List Arcs in Family' in the 'Information' menu of the ASSEMBLY module consistently lists all arcs in the selected family.
- The 'Display Info' item of the DISPLAY menu in the Display module is now functional.
- 'Window View', 'Zoom View', and 'Shift View' in the 'View' menus of the DISPLAY, ASSEMBLY, and DRAW modules now erase the view delimiting lines when 'Retry' or 'Cancel' is selected.
- 'Area', 'Perimeter', and 'Distance' items in the DISPLAY module 'Calculate' menu now work for mapfiles with unspecified projections.
- 'Area' and 'Perimeter' items (DISPLAY module 'Calculate' menu) now find values for the polygon closest to the point where the user clicks, or else issue an Alert saying that no polygons were found.
- Positions of 'Zoom View' and 'Shift View' in 'View' menu of DISPLAY module have been reversed.
- First three entries in DISPLAY module 'Edit' menu rearranged so order is: 'Add/Replace ID', 'Insert ID', and 'Delete ID/Group'.
- In the DRAW module, items in the 'Arc' menu such as 'Open', 'New', and 'Abandon' no longer change the view (magnification, etc.) when selected; only items in the 'View' menu change the view.
- 'Append Arc' has been moved from the 'Modify' menu to the 'Arc' menu in the DRAW module.
- New databases have been added to the QuickMAP sample mapfiles. They are: ARSE-NAL, which contains information on prairie dog distributions and bald eagle telemetry studies at the Rocky Mountain Arsenal, Colorado; COLOBAT, which contains data on the distributions of several bats in Colorado; and CRANE, containing observations of Whooping Cranes in seven western states during recent years.
- There is a section in the Appendices with brief descriptions of the QuickMAP sample mapfiles and their contents.

From 2/22/91 to 5/22/91

- Menu items 'List Views' ('Information' menu) and 'Set World' ('Options' menu) added to the DISPLAY module
- MapID names can now begin with and contain special characters corresponding to ASCII codes 33 through 122. However, the following special characters are still NOT allowed: *, ?, and '
- To aid in locating the paper tablet menu in the DRAW module, positioning hints are now given on the dialog if the menu is found to be crooked after arrow number three is digitized
- Device dependent extensions (ie., EGA, VGA, CGA, HGC) added for 'Save View' and 'Load View' (DISPLAY 'View' menu). Any view files saved prior to this distribution should be re-named with the extension corresponding to the user's monitor type
- New GALLERY features added to store projection ('Define Projection') and coordinate units as part of the mapfile. The user also may select different units which are saved in the mapfile) to report area and distance calculations
- CTRLPTS utility enhanced to edit previous entries and supply defaults which are editable
- Additional format and naming conflicts now reported by the ChkMOSS utility
- MOSS2QM utility modified to handle many more format and naming problems

From 5/22/91 to 6/5/91

- 'Export' in the GALLERY 'Utilities' menu was modified to properly handle one or more IDs, null arcs, and point count for polygons with holes

From 6/5/91 to 11/21/91

- Added 'MergeMap' utility to move, merge, or replace mapIDs from one mapfile to another
- 'WeedArcs' utility added, which filters coordinates from a mapfile based on area and distance algorithms
- New utility, 'ChkDLG', checks a DLG file and summarizes the contents
- New utility, 'LLGrid', added that generates a latitude longitude grid based on extents, grid spacing, and coordinate increments specified by the user

- A "mouse delay" was built into QuickMAP because, on some faster 386 and 486 computers, single clicks were being translated as multiple clicks
- Filling polygons in the DISPLAY module was updated so patterns output to a printer better reflect the patterns on the screen
- The DISPLAY module point symbols were changed to reduce the difference in size of markers on output
- DLG2QM utility modified to handle selective extraction and aggregation of major minor codes
- New data, consisting of state and county DLG files for the conterminous United States, now being distributed with QuickMAP
- QuickMAP program overlay and memory management was revised and improved
- Established Version 1.3 of QuickMAP with MegaBASIC version 5.650

From 11/21/91 to 12/11/91

- Scrolling of the Map List was better implemented in DISPLAY

From 12/11/91 to 1/24/92

- New menu item in ASSEMBLY, 'Arc Names On/Off' ('Options' menu), when selected 'On' labels the individual arcs drawn on the screen and for output
- 'Audit', a new QuickMAP utility, added to list mapID and arc names to printer, screen, or text file
- New utility, 'FixIDLst' checks for and fixes problems with the list of mapIDs in an arc record
- New utility, 'FixTable' checks and fixes pointers to arc records in ID tables
- New version of PROJECT utility with options to handle mapfiles, MOSS export files, and points now directly available from the QMUtil menus
- Bug in ASSEMBLY fixed so arcs are now redrawn properly in the current direction
- Bug in Output that terminated QuickMAP fixed

- Bug in option 1 of DLG2QM that damaged mapfiles fixed

From 1/24/92 to 6/26/92

- New batch file, QMUTIL.BAT, now runs the executable version of QMUtil and requires "MBPATH" to be set. This provides for consistent handling of paths and directories across all utility programs.
- User's Manual part 5 updated to reflect changes in prompts for filenames/directories/paths in utilities.
- QuickMAP scratch files are now written to the TEMP directory if this is set up as part of the DOS environment.
- Paths and filenames now may be edited in all utilities.
- The point symbol under 'CURRENT' in the DISPLAY 'Toolkit' panel is now shown twice: once on the left side and once on top of the shaded box on the right. The latter is to ensure that, if white is chosen as the color for the point symbol, it can still be seen on the gray shaded box.
- The shaded box under 'CURRENT' in the DISPLAY 'Toolkit' panel is now solid gray, rather than a gray "dither" as before. If gray is the color selection, however, the shaded box is shown as black.
- When white is the selected by clicking on its box in the 'Toolkit' panel, the COLOR SELECTION dialog is displayed in gray to ensure that the white can be seen.
- Projections defined in the GALLERY ('Define Projection', 'Utilities' menu) are now displayed in DD,MM,SS format, where DD=degrees, MM=minutes, and SS=seconds. This previously was displayed in Decimal Degrees format.
- Group commands ('Modify' menu, DISPLAY) now handle more than nine groups correctly.
- The handling of null arcs by DRAW has been improved. DRAW can now read, but will not Save, null arcs.
- Several "bugs" have been eliminated from the 'Make Group' command ('Modify' menu, DISPLAY).
- New, more complete DISPLAY "walk-through" section added to part three of the User's Manual.

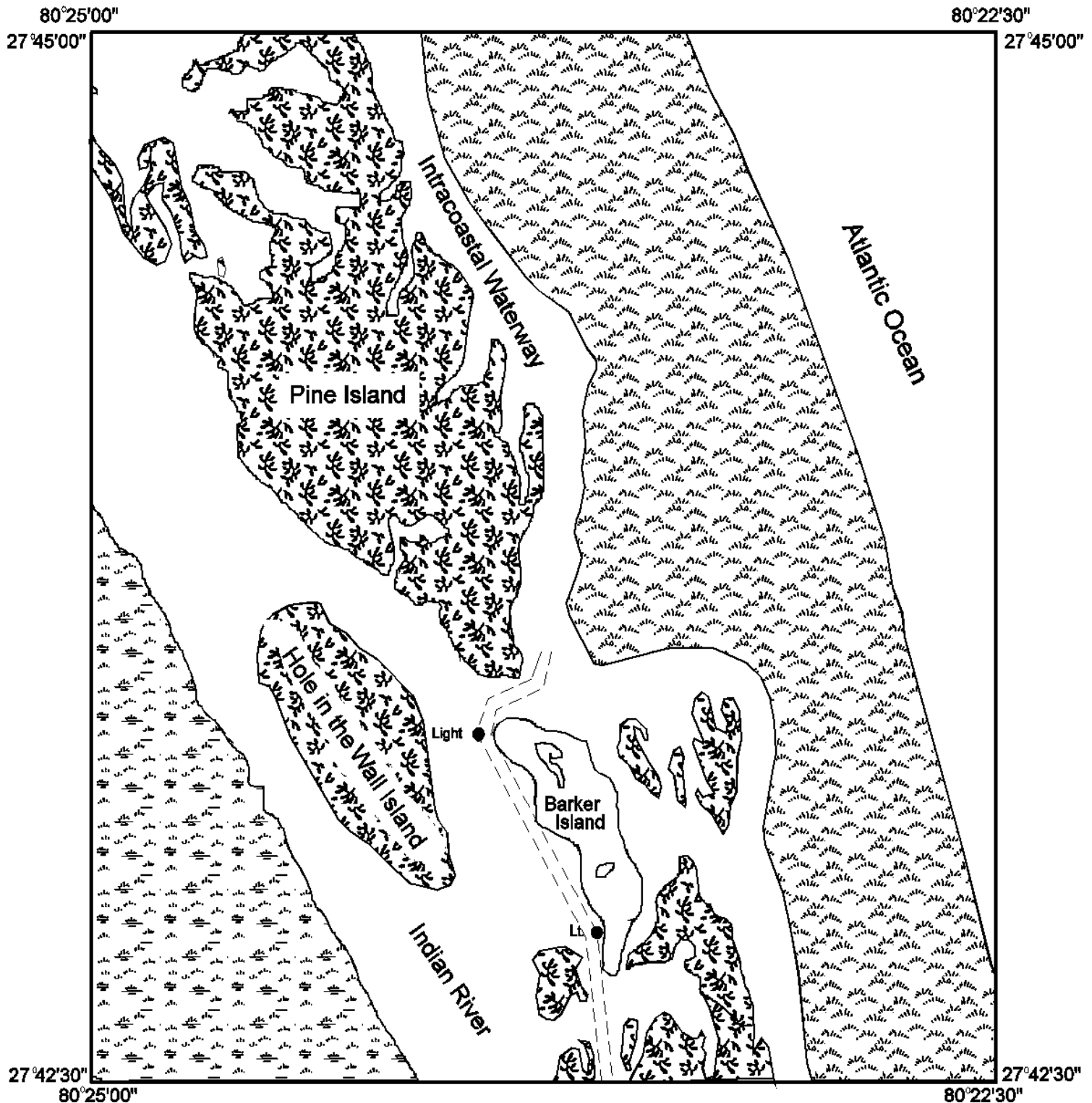
- New sections describing DLG and Lookup Table format added to User's Manual, part five.
- New sections added to User's Manual explaining use of: ChkDLG, to examine the contents of a DLG format data file; FixIDLst and FixTable, that repair certain types of damage to QuickMAP mapfiles; and Latitude/Longitude Grid, to generate a grid of control points.
- User of the PROJECT utility has been slightly modified and simplified, and the User's Manual updated to reflect the changes.

From 6/26/92 to 6/7/93

- Output from DISPLAY now has option of creating a legend for colors, point symbols and fill patterns used, with Groups or MapIDs as labels.
- DISPLAY now provides scaling of output based on a page size or scale factor provided by the user.
- New menu item in the GALLERY, 'Reset World', allows the mapfile extents (minimum bounding rectangle or MBR) to be set by the user; the mapfile header is altered and commands using the MBR in all modules are affected.
- Audits, or listings, in all QuickMAP modules may now be any length.
- When very complex polygons are being drawn and filled in DISPLAY, the Alert 'Polygon too complex to fill' is now written on the Status Line for five seconds with an accompanying beep, then disappears automatically. Previously, this Alert was written in the workarea and had to be cleared by the user before drawing continued.
- The Group Name Delimiter is no longer used in DISPLAY's maplists; however, old .QMM files with Group Name Delimiters still work.
- Clipping has been implemented so that .GEM output files from QuickMAP now import more accurately into other software packages.
- The utilities, 'QMUtl', are being run differently with environmental variables set in a batch file to provide more space; this change is transparent to the user.
- The PROJECT utility now offers the option of reprojecting an entire QuickMAP mapfile.
- The PROJECT utility has been restructured to run more efficiently and to provide the user with more on-screen information during processing.
- A problem with the way DRAW interpreted the world view for empty vs. non-empty mapfiles in different projections was corrected.

- Data input to PROJECT altered so that handling and reporting of geographic coordinates are more flexible and consistent.
- More new DLG data, including administrative boundaries for the United States, a base map with country boundaries for the world, and rivers of the world now being distributed with QuickMAP.

Sample Map from USGS Vero Beach, FL Quad (see "How to Create a Geographic Database")



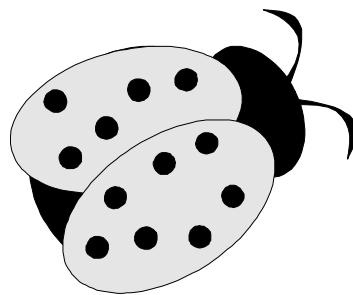
Arrow
2

Arc	Modify	View	Information	Options	DRAW
New	Insert Before	World View	Help	Draw Input Mode	DRAW Info
Open...	Insert Close	Arc View		Locate Tablet Menu	
Append...		Window View	List Families	Set World	GALLERY
	Delete with Cursor	Zoom View	List Arcs		ASSEMBLY
Save/Next	Delete with Keyboard	Shift View	List Arcs in Family...	Register Tablet	DISPLAY
Save as...	Delete All Points	Redraw	List Unused Arcs in Family...		
Delete...		Overlay...	List IDs with Arc...	Show/Hide Coordinate Values	
Abandon	Delete Last Point		List IDs	Show/Hide Ticks	
Quit		Find Point(s)		Show/Hide Direction	
Choice 1	Choice 2	Choice 3	Choice 4	Choice 5	Choice 6
<div> <div>QuickMap - Digitizing Menu</div> <div>January 1991</div> </div>					

Arrow 1

Arrow 3

QuickMAP



Report

Name: _____ Date: _____

Phone: _____

Pathway leading to the Problem:

Module:

☐

Gallery

☐

Display

☐

Assembly

☐

Draw

☐

Utilities

Menu: _____

Menu Item: _____

☐

Dialogue

Title/Description: _____

☐

Alert

Diagnostics:

Program Error Message: _____

Statement Number: _____

In Line number: _____

of Package (.pgm): _____

Information in Use

Mapfile: _____

ID: _____

Arc: _____

Other files: _____

This image shows a single sheet of white paper with horizontal blue ruling lines. The paper has rounded corners and a thick black border around the edges. There are 20 horizontal lines in total, evenly spaced across the page. The paper is oriented vertically.



Date Fixed: